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# THE AMERICAN JOURNAL OF PHARMACY.

JANUARY, 1884.

## CANELLA ALBA.

BY JOHN P. FREY, PH.G.

*From an Inaugural Essay.*

After a detailed botanical description of the plant, and a histological description of the bark, accompanied by micro-photographs of the transverse and longitudinal section, the author states the result of his analysis thus : volatile oil 1·28, resin 8·2, mannit 6 to 8, ash 8·9 per cent., starch in considerable quantity, bitter principle, albumen and cellulose.

Ten pounds of well-selected bark was carefully distilled, and from the distillate 896 grains (1·28 per cent.) of *volatile oil* was collected, only a minute quantity being wasted. The oil was in two portions, one heavier and the other lighter than water ; the former was ·70 per cent. and the latter ·58 per cent. Both oils have a very strong, fragrant, somewhat camphoraceous odor, and a pungent, aromatic taste, the heavy oil being stronger in taste and odor. The odor of the bark is due to these volatile oils. The specific gravity of the heavy oil is 1·012 ; it is reddish-brown, begins to boil at 200°F., and the temperature gradually rises to 420°F., when it remains constant. It congeals at 38°F. The light oil has the specific gravity ·988, is of a light straw color, begins to boil at 185°F. ; congealing point about 22°F. Both oils have a strong acid reaction. Nitric acid acts upon them violently, producing a red resinous mass which is insoluble in alcohol, ether and potassium hydrate. Sulphuric acid produces a deep blood-red color. Iodine dissolves in both oils slowly and quietly. Ferric chloride produces a deep blue color, showing the presence of eugenic acid or eugenol. By neutralizing the oils with potassium hydrate and distilling, the residue is a crystalline mass of potassium eugenate, from which, with sulphuric acid and distilling, eugenol is obtained as a colorless oily liquid, having a pleasant odor. The distillate of the oils with excess of potassium hydrate contained two colorless oils, one heavier

and the other lighter than water. The latter is neutral to litmus, and when treated with sulphuric acid turns to blood-red, but nitric acid and ferric chloride do not affect it. The heavy oil was in such small quantities that enough could not be obtained to ascertain its nature.

The *resin*, which was obtained by exhausting the drug with alcohol, evaporating and pouring the concentrated tincture into water, is of a pale yellowish color, destitute of odor and taste, soluble in ether and chloroform, slightly soluble in cold, more so in boiling solution of potassa; insoluble in turpentine or cold and hot water. The solution in potassa is precipitated on the addition of hydrochloric acid, and the alcoholic solution is precipitated by triplumbic acetate, but not by normal acetate. Both chloroform and ether solutions have a distinct acid reaction. When incinerated it yields a pale yellowish ash.

A crystalline principle was obtained by exhausting the bark with hot water, evaporating the solution to a very small bulk, and allowing this to stand in a warm place for a few days, when the whole mass became crystalline; it was then recrystallized from hot alcohol, the solution being filtered warm through animal charcoal; on the slow evaporation of the alcoholic solution rather large crystals will form. It crystallizes from water in colorless rhombic prisms, and from hot alcohol in fine needle-like crystals. They are freely soluble in cold and hot water; sparingly in cold, but readily in boiling alcohol, again crystallizing out upon cooling; insoluble in ether, and when heated on a platinum dish wholly volatilize. This is the crystalline principle which was called by some of the older writers "*Canellin*," but which Mayer and Von Reiche, in 1843, showed to be mannit. By a series of tests made in comparison with mannit from manna, I have found the two to be identical.

Wax was found in small quantities by treating the residue exhausted with alcohol with chloroform. Starch is present in considerable quantities, as was shown by the iodine test. The presence of gum was shown by a solution of triplumbic acetate and ammonium oxalate. Albumen is present and can be detected with mercuric chloride, or by coagulating with heat. The bitter principle is isolated with much difficulty; it is soluble in water and alcohol, and is not precipitated by triplumbic nor normal acetate. The bark is entirely free from tannin.

Water extracts 22 per cent. and alcohol 10 per cent. of the constituents of the bark. A tincture and fluid extract prepared some time ago remain perfectly clear. The tincture represents 10 per cent. of the



drug with a menstruum of alcohol 3 parts, water 1 part. The fluid extract was made with alcohol, and every cubic centimeter represents a gram of the drug. A solid extract was also prepared by exhausting the drug with alcohol 95 parts and glycerin 5 parts.

The ash was analyzed with the following results :

Calcium carbonate .....	83.00	} Insoluble in water.	88.40
Magnesium carbonate.....	1.70		
Aluminum and ferric oxides.....	2.60		
Calcium phosphate.....	1.10		
Potassium chloride.....	1.30	} Soluble in water.	13.10
Sodium carbonate.....	4.50		
Sodium sulphate.....	1.30		
Sodium chloride.....	6.00		
	101.50		101.50

## THE FRUIT OF OPUNTIA VULGARIS, LIN.

BY WILLIAM W. LIGHT, PH.G.

*From an Inaugural Essay.*

The fruit begins to appear in July and ripens about the middle of October. It is about an inch in length, one-half to three-fourths of an inch in thickness, roundish pear-shaped, marked at the apex with concentric rings, and beset with rudimentary bristles in spiral rows. It is crimson externally, and internally of a still brighter color and frosty, sparkling appearance, it is covered with a thin tough skin, underlying which is a thickish pulpy rind. The berry-like fruit is filled with seeds arranged in longitudinal rows imbedded in and surrounded by a fleshy mucilaginous pulp and separated by white dissepiments. The seeds are from eight to twenty in number, in five rows alternately arranged with one capping-seed, to which the tough epidermis, in the centre of the umbilicated apex of the fruit, is attached. The seeds are flattish, circular and uneven, one-eighth to three-sixteenths of an inch in diameter and fully one-eighth of an inch through the thickest part. The seed is anatropous. The rhaphe forms a prominent bony margin nearly around the entire seed. The testa is cartilaginous, of uneven thickness and of a whitish color. The portion immediately surrounding the chalaza is very thin and is translucent. The membranous tegmen of the seed is of a shining blackish brown color, which is plainly

visible through the thin portion of the testa and gives that part of the seed a bluish black appearance. The embryo is imbedded in the oily albumen and has the cotyledons set contrary to the sides of the seed. It forms a little more than a complete circle and encloses a white, starchy centre. The fruit has an agreeable, slightly acid and very mucilaginous taste and a refreshing odor. It is frequently eaten, the seeds of necessity swallowed whole as it would be almost impossible to crush their shell-like testa between the teeth, or to separate them from their mucilaginous envelope.

The ripe fruit contains 68.2 per cent. of moisture. The ash amounted to 1.76 per cent. of the entire fresh fruit. It consists largely of silica, besides carbonates, chlorides, sulphates and phosphates, with potassium, sodium, aluminium, iron, magnesium and calcium. The seeds are about one-sixth the weight of the entire fruit.

The seeds and enveloping pulp were placed in a coarse linen bag to remove the mucilaginous matter by maceration in water. The mucilage had an acid reaction and possessed a beautiful light crimson color, which was completely discharged by heating on a water-bath or by the addition of an alkali.

The mucilage was not affected by oxalate of ammonium or concentrated solutions of ferric chloride or of sodium borate, but a precipitate was formed with both the normal and the basic lead acetate. The mucilage was precipitated by alcohol, obtained on a filter, dried in scales over a water-bath and preserved for further examination. The filtrate from the mucilage responded clearly to tests for glucose and pectous compounds but contained no tannin. The skins with a portion of the pulp left after the removal of the seed, were macerated in alcohol for several days the filtered product being a wine-red tincture of a pleasant fruit-like odor and acid reaction to litmus. This tincture was diluted with water and the alcohol distilled off on a water-bath. In this operation the wine-red color was discharged, the liquid assuming a green and then a light straw color. After removing the coloring-matter from the solution with benzin, a portion was precipitated by lead acetate. The precipitate did not behave as lead malate when heated under water, but was mostly soluble in solution of ammonium chloride. Another portion of the solution gave no precipitate with calcium sulphate, but with an excess of calcium hydrate, a white precipitate was produced. This precipitate was soluble in a solution of potassium hydrate, and the solution formed a gelatinous precipitate on

boiling which was partially dissolved again after the solution was cooled, thus proving the presence of tartaric acid. The precipitate was also soluble in acetic acid.

The filtrate from the lime precipitate was boiled, when a slight precipitate was formed insoluble in solution of potassium hydrate, showing the presence of citric acid. On adding solution of potassium permanganate it was not decolorized until upon the addition of potassium hydrate when the color was slowly changed to green.

The seeds, after having been dried, were reduced to powder, and macerated with benzin at a warm temperature for several days, then packed in a percolator and exhausted with benzin. The powder was dried and a portion of it was digested for several days in alcohol, packed in a percolator and exhausted with alcohol. In like manner they were successively exhausted with water, with a very dilute solution of potassium hydrate and with water acidulated with sulphuric acid.

The benzin product from the seeds was an amber-colored oil, which oil was purified by washing with water and afterwards with chloroform. It was then found to weigh 7.25 per cent. of the weight of the seed extracted, and to be of specific gravity .926. It possessed a slight disagreeable odor and insipid taste, insoluble in alcohol or chloroform, soluble in benzin and ether.

Treated with 25 per cent. nitric acid and a strip of copper turnings, the mixture assumed a red-brown color, but after a day became partly solidified and lighter brown. A quantity of the oil was saponified by potassium hydrate; the solution precipitated by and washed with sodium chloride, and the soda soap decomposed with hydrochloric acid. The fat acid was odorless and tasteless, of a translucent milky color and with slight acid reaction. Its lead salt seemed to be but slowly soluble in alcohol and insoluble in ether. The mother liquor of the soap contained glycerin.

The alcoholic percolate of the seeds was nearly colorless and inodorous and of but slight taste foreign to alcohol and gave evidence of the presence of glucose. It was evaporated to dryness, thoroughly washed with water, and with chloroform to remove a greenish extractive matter, when a red-brown resinous residue was left having a slight disagreeable odor, a slight nauseous, disgusting taste, fusible at 100°C., insoluble in benzin, chloroform or ether, but soluble in alcohol, diluted alcohol and carbon disulphide.

The percolates with cold and hot water contained glucose, starch, and albumen; but neither a glucoside nor an alkaloid could be detected.

The dried gum was found to be entirely insoluble in water or alcohol, but in the presence of an alkali it became soluble.

Of the powdered seeds extracted with benzin 75 grams were boiled with several portions of water until the water from them gave no coloration with iodine; the starch was converted into sugar; this was estimated by Fehling's solution, and the starch calculated from it giving 3.95 gram or 5.268 per cent.

The residuary powder was now boiled with diluted sulphuric acid for several hours, when the liquid contained glucose and on concentrating it transparent rhombic crystals were formed, which were insoluble in alcohol or ether, readily soluble in boiling water, and this solution was not precipitated by ammonium oxalate.

In reviewing the results of my work we find in this unpretending and unnoticed plant, not only a remarkable and peculiar histology, but interesting constituents which surely seem to possess sufficient individuality to deserve a closer investigation.

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## LUFFA AEGYPTIACA.

BY REINHARD J. WEBER, PH.G.

*From an Inaugural Essay.*

*Description.*—*Luffa ægyptiaca*, nat. ord. cucurbitaceæ, is indigenous to Egypt and Arabia, and is a large climbing vine, with a thin, but very tough light green succulent stem, attaining a length of from ten to thirty feet. The leaves are alternate and palmately lobed, of a light green color and almost destitute of taste. The flowers are monoecious; petals five, united below into a bell-shaped corolla; anthers cohering in a mass; ovary two-celled, style slender, stigmas three. The fruit is elliptical ovate, fleshy and indehiscent, with a green epidermis, longitudinally marked with black lines, varying from ten to fifteen in number; under each of these lines is found a tough woody fibre. The fruit attains a length of from six to twenty-five inches. I have seen a specimen of the fruit, grown in Allentown, Pa., which measured thirty-four and a half inches in length, and nine inches in diameter. When the epidermis is removed it presents a layer of interwoven woody fibres, which may be used like a sponge, being hard and rough when dry, and soft when soaked in warm or



cold water; they absorb the latter with the same facility as the ordinary sponge, and have the advantage over the sponge not to wear out by ordinary use for a number of years; hence, the name of "Vegetable Sponge," or "Wash Rag," and its use as a flesh glove. The seeds are numerous, and are almost flat, broadly ovate, three-eighths of an inch long. The testa is of a blackish brown color and rough, cotyledons almost flat, of a yellowish brown color and oily.

*Analysis.*—An infusion of the epidermis of the fruit (1 to 10) was made and tested for tannin, with tincture of chloride of iron, with sulphate of iron, and Russian isinglass, whereby a trace of tannin was shown, 100 grains of the epidermis thoroughly dried, yielded fifty-four per cent. of residue; on being incinerated at a low heat, the epidermis (dry?) yielded twelve per cent. of a dark gray ash, one half of which was soluble in water; the ash consisted of silica, carbonates and sulphates of potassium and calcium. The fibrous portion, after being incinerated, yielded sixteen per cent. of ash, partly soluble in water.

The fruit contains a large amount of mucilaginous substance, which yields a white precipitate with solution of subacetate of lead.

An infusion of the fibrous portion, when evaporated to a syrupy consistence, became gelatinous on cooling. The gelatinous mass had all the properties of bassorin, and was free from starch. One troy ounce of the epidermis was powdered, and successively exhausted with benzin, alcohol and water. The benzin solution yielded a small quantity of yellow coloring matter; the alcoholic tincture left chlorophyll and a little extractive, and the infusion gave twenty per cent. of slightly bitter extract.

One troy ounce of the powdered seeds was treated with boiling benzol; the green solution, on being evaporated, yielded two and a half per cent. of a brown, fatty oil, and twelve per cent. of a green mass. The latter, on being treated with very dilute hydrochloric acid, and evaporating the liquid, yielded a minute amount of crystals. Similar crystals were also obtained from the green alcoholic extract of the seeds previously exhausted with benzol. Water afterwards took up nothing of note.

*Mode of preparing the fibrous portion.*—The fruit is cut longitudinally on one side, stripped of the epidermis, the seeds are then removed, and the net work of fibres is washed thoroughly to get rid of the mucilaginous substance and dried. It is then ready for use. This fibrous portion is the only part of the plant, as far as I know, that has ever been in use.

## PRACTICAL NOTES.

BY THOS. S. WIEGAND, PH.G.

*Read at the Pharmaceutical Meeting, December 18, 1883.*

*Glycerite of Tar.*—The omission of this glycerite from the new Pharmacopœia renders desirable a preparation that may be made without difficulty, and that will enable the pharmacist to furnish the various liquid preparations into which tar enters, in a cleanly, easy and expeditious manner. The glycerite made by the following formula being miscible with water in all proportions, and yielding a clear liquid, commends itself to the favorable consideration of pharmacists:

Oil of tar.....	f 3i
Alcohol.....	f 3ii
Glycerin and water, each.....	f 3iv
Magnesium carbonate, q. s., or.....	3vi

Mix the oil of tar with the alcohol, and rub these thoroughly with the magnesia to a smooth paste; to this add the glycerin and water previously mixed together; put the mixture into a well-corked bottle, and let it remain for several days, shaking it frequently; then filter through paper.

For preparing *syrup of tar* add f 3ii of glycerite to f 3xiv of syrup.

*Tar water* may be made very readily by using 3ss of glycerite and water sufficient to make a pint.

*Wine of tar* may be made by using

Glycerite of tar.....	3iii
Sherry wine.....	3iv
Syrup.....	3ii
Water, enough to make.....	Oi

*Tar ointment* may be made much more easily and much smoother by using two drachms of oil of tar with six drachms of simple cerate.

*Choleate or Choleinate of Soda.*—Under this name a preparation made by evaporating purified ox gall has been introduced and used as a very gentle and efficient laxative in cases of torpid liver; it is thought to have less tendency to leave the bowels in a torpid state after ceasing to use it. The article is described in the National Dispensatory, but seems to have attracted less attention than it merits. It is recommended to be prepared by treating fresh ox gall with twice its bulk of alcohol; the mixture is shaken frequently during twelve

hours, the clear liquid is decanted, the alcohol distilled off, the remaining liquid filtered through well-washed animal charcoal and evaporated to dryness, or, when sufficiently concentrated, it is spread on glass plates exposed to a heat of about 140°F. till it scales. When thoroughly dry it should be preserved in well-stopped vials. It is given in doses of 5 to 10 grains, in the form of pills, as it is too unpleasant for any other form of exhibition. This method of dessication is quite important, as the preparation becomes very tough if dried in mass.

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## IMPURITIES IN CHLORIDE OF BARIUM.

BY A. E. BROWN.

*Read at the Pharmaceutical Meeting, December 18, 1883.*

While making a quantitative analysis of chloride of barium which had been sold as chemically pure, I found a deficiency of more than 2 per cent., each successive analysis producing the same result. A qualitative analysis for impurities was made as follows: to a concentrated solution of the salt was added chloride and hydrate of ammonium, when hydrate of aluminium was precipitated. No other impurities were found.

A quantitative analysis of the salt now showed that it contained 2.23 per cent. of chloride of aluminium. The formula  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$  requires Ba 56.16, Cl 29.09, or  $\text{BaCl}_2$  85.25 per cent.;  $\text{H}_2\text{O}$  14.75 per cent.; total 100. The result of the analysis was  $\text{BaCl}_2$  82.61,  $\text{Al}_2\text{Cl}_6$  2.23,  $\text{H}_2\text{O}$  14.75 per cent; total 99.59.

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## BLEACHING POWDER AND ANALOGOUS COMPOUNDS.

BY G. LUNGE AND P. NAEF.

As Kraut has recently taken up the subject of the constitution of bleaching powder, directing a polemical paper against the investigations of Lunge and Schaeppi ("Amer. Jour. Phar.," 1881, p. 608), the authors have repeated their former experiments, and those of Kraut, with a view of establishing the correctness of the formula  $\text{Cl} \cdot \text{Ca} \cdot \text{OCl}$  first proposed by Odling. In their former paper great stress was laid on the complete and ready expulsion of all the chlorine in bleaching powder by carbonic anhydride in the presence of a little moisture, as militating against the presence of free calcium chloride. Kraut has

shown that calcium chloride, when treated with a mixture of hypochlorous anhydride and carbonic anhydride, forms calcium carbonate thus:  $\text{CaCl}^2 + \text{Cl}_2\text{O} + \text{CO}_2 = \text{CaCO}_3 + 2\text{Cl}_2$ , and concludes from this that calcium chloride is present as such in bleaching powder. But the authors point out that this reaction can equally be explained by the intermediate formation of bleaching powder and its subsequent decomposition thus:  $\text{CaCl.OH} + \text{HOCl} = \text{H}_2\text{O} + \text{CaCl.OCl}$  and  $\text{CaCl.OCl} + \text{CO}_2 = \text{CaCO}_3 + \text{Cl}_2$ . To prove the correctness of their interpretation, a series of experiments were conducted in which pure hypochlorous anhydride was passed over pure calcium hydroxychloride,  $\text{CaCl.OH}$ , and the chloride; in every case the resultant material always contains a considerable proportion of bleaching powder (mixed with unaltered chloride and traces of chlorate), which can be subsequently decomposed by carbonic anhydride. Kraut's experiments are therefore inconclusive.

Secondly, Kraut having established that when lithium hydroxide is heated with chlorine, only half of it is attacked with formation of  $\text{LiCl} \rightarrow \text{LiOCl}$ , draws the conclusion that as the lithium hydroxide is an integral part of the resultant compound, so calcium hydroxide is an integral part of bleaching powder. The authors, however, show that 80 per cent. of lithium hydroxide can be converted into the mixture  $\text{LiCl} + \text{LiOCl}$ , which is far less stable than bleaching powder in presence of excess of chlorine, in that it gives off oxygen, the presence of which could be recognized. On the other hand, the mixture  $\text{LiCl} + \text{LiOCl}$  is far more stable than bleaching powder towards carbonic anhydride; at low temperatures it is practically unaltered, whilst at higher temperatures the mixture is converted partly into the chloride and chlorate, and is partly decomposed into the chloride and oxygen. The gas given off is not chlorine, but hypochlorous anhydride. As the properties of the so-called chloride of lithia differ so markedly from those of bleaching powder, a different constitution must be assigned to each. Arguments drawn from the behavior of the one compound have no bearing on the constitution of the other.

The analogous compounds of barium and strontium were also examined; that of barium is very unstable, whilst that of strontium is readily prepared, and resembles bleaching powder in its decomposition by carbonic anhydride.—*Jour. Chem. Soc.*, Nov., 1883, from *Annalen* [219], 129–161.



## NOTES ON THE SODA INDUSTRY.

BY A. SCHEURER-KESTNER.

I. *Loss of Sodium in the Le Blanc Process.*—Eleven years ago the author established that the loss of sodium experienced in the Le Blanc process is proportional to the quantity of chalk employed. It is thus to the interest of the manufacturer to avoid excess of chalk, but at the same time to use a quantity sufficient to ensure perfect whiteness of the finished product. The author put forward the hypothesis that the loss is occasioned by the formation of a sparingly soluble calcium-sodium carbonate; this view has been confirmed by the researches of Jurisch, Watson Smith, and Liddle and Reidemeister. The latter has found in the lixiviating vats crystals of the composition of gaylussite,  $\text{Na}_2\text{CO}_3 \cdot \text{CaCO}_3 \cdot 5\text{H}_2\text{O}$ , a compound insoluble in sodium carbonate and hydrate, mixed in the proportion in which they occur in the crude lye; it dissolves slowly in water, the crystals becoming opaque from the ready dissolution of the sodium carbonate.

Reidemeister has further shown that gaylussite is formed not only in the lixiviating vats, but also in the anhydrous state in the soda pans during fusion; it probably also occurs in the residues, and the deposit of the caustification process, but its state of division prevents its detection and isolation.

II. *Presence of Vanadium, Fluorine, and Phosphorus in Crude Soda-lyes.*—In 1864 Rammelsberg detected the presence of vanadium and of sodium phosphate,  $\text{Na}_3\text{PO}_4 \cdot 10\text{H}_2\text{O}$ , in crude soda-lyes; Baumgarten, a short time after, found fluorine existing as a double sodium phosphate and fluoride,  $\text{NaF}_2\text{Na}_2\text{PO}_4 \cdot 18\text{H}_2\text{O}$ . From the red mother-liquors in the manufacture of the carbonate and hydroxide, Rammelsberg separated crystals, either white, or red from the presence of iron, which proved on analysis to be identical with Baumgarten's compound; they also contained about 1.2 per cent. of vanadic acid. It is probable that the chalk and coal furnish the vanadium and phosphorus; the origin of the fluorine is quite uncertain.

III. *Loss of Sodium in Caustification.*—The author has previously shown that the loss of sodium in caustification arises from the same cause as the loss of sodium in the Le Blanc process, *i.e.*, the formation of a double sodium calcium carbonate. Analyses by Jurisch (*Chem. Indust.*, 1880, 377) would lead to the conclusion that this loss is less

the greater the excess of lime; but this statement is in direct contradiction to experience. According to Jurisch, the density of the liquor for caustification should not exceed  $14^{\circ}$  Baumé; the author, however, points out that under ordinary atmospheric pressure it is impossible to caustify denser liquors than these, for the reaction became incomplete owing to a commencement of a reverse chemical change. The author also criticises Jurisch's statements as regards the amount of combustible substance required for the evaporation of caustic soda of various densities.

In the remainder of the paper no new chemical facts are detailed; the author quotes, and offers some critical remarks upon Weldon's statements as regards the extraction of ammonia from coal, the use of pyrites from Rio Tinto for the manufacture of sulphuric acid, and the total production of sodium carbonate from the Le Blanc and the ammonia processes throughout the world.—*Jour. Chem. Soc.*, Sept., 1883.

## ACIDUM OLEICUM—OLEIC ACID.

BY DR. E. R. SQUIBB.

A yellowish oily liquid, gradually becoming brown, rancid and acid, when exposed to the air; odorless or nearly so, tasteless, and, when pure, of a neutral reaction. Sp. gr. 0.800 to 0.810. Oleic acid is insoluble in water, but completely soluble in alcohol, chloroform, benzol, benzin, oil of turpentine and the fixed oils. At  $14^{\circ}$  C. ( $57.2^{\circ}$  F.) it becomes semi-solid, and remains so until cooled to  $4^{\circ}$  C. ( $39.2^{\circ}$  F.), at which temperature it becomes a whitish mass of crystals. At a gentle heat, the acid is completely saponified by carbonate of potassium. If the resulting soap be dissolved in water and exactly neutralized with acetic acid, the liquid will form a white precipitate with test solution of acetate of lead. This precipitate, after being twice washed with boiling water, should be almost entirely soluble in ether (abs. of more than traces of palmitic and stearic acids). Equal volumes of the acid and of alcohol, heated to  $25^{\circ}$  C. ( $77^{\circ}$  F.) should give a clear solution, without separating oily drops upon the surface (fixed oils).—*U. S. P.*

Just now this acid seems to be an important addition to the Pharmacopœia, and a good description and tests much needed. But those given above, which are most definite and most characteristic, do not apply to the oleic acid, which is generally accessible, and which has been exclusively, or almost exclusively, used in this country since the oleates were introduced here.\* And if this description and tests is to apply in future, the entire practice must be revolutionized, and this writer does not know of such an oleic acid, nor where it is to be



obtained. Both the pharmacy and the therapeutics of the acid and the resulting oleates have been based on a substance which, though comparatively easily obtained, would not be admitted to use under the officinal description and tests, and yet upon this substance almost, if not all the medicinal results have been obtained thus far.

When the oleates first attracted much attention here the Chairman of the Committee of Revision of the Pharmacopœia of 1880, published in "The American Journal of Pharmacy" for January, 1873, vol. xlv., p. 2, a process for obtaining oleic acid of sufficient purity for these externally applied oleates, from the commercial acid or "red oil" of the candle makers. And this process, with slight modifications by the writer and others, has been followed ever since, and has supplied all, or nearly all the acid used in medicine up to this time. The authority for this statement is, that the writer believes himself to have been much the largest user of oleic acid in this country up to a late date. Having commenced to make the oleates from this acid, in 1871, when a single barrel of the acid satisfied the demand for a year, these oleates, without the least advertising or drumming of any kind, have steadily increased in use until this year, when fifteen barrels was insufficient, and many orders for the acid, in large quantities, to supply other makers of oleates, had to be declined. Only within the past year or two has the demand for oleates been sufficient to attract the attention of "the trade," and now that they are being largely advertised, the writer does not know what acid is being used, except that he has freely told every one who has asked, the source of his own supply, and his method of purification, and except that he has supplied several makers of oleates.

The candle makers use all sorts of fats, good and bad, that will yield them a firm, solid, stearic acid, and many of these fats they buy cheaply in the form of various kinds of refuse; and they continue their process all the year round. Much of the fat is rancid when they use it, and all through the summer it is all apt to be more or less rancid. But they do not get enough scrap fat, and inferior stock, and often have to use good fresh and sweet fats. By only going to them, in cold weather, and by watching for opportunities when they are working on good materials, and by paying full prices for a little extra pains, cleanliness, etc., a crude acid can be had in any quantity that is quite proper for medicinal uses. This is the best, and perhaps exceptional quality, of the "red oil" of the market, and when this is

distilled in a current of superheated steam, it becomes a pale brownish yellow oily liquid, transparent at summer temperature, but at  $15^{\circ}\text{C} = 59^{\circ}\text{F.}$  it deposits about half its volume of crystalline white palmitic or margaric acids. The transparent portion separated and subjected to a temperature of about  $10^{\circ}\text{C.} = 50^{\circ}\text{F.}$  deposits an additional portion of the solid acids. These, when carefully filtered out at or below this temperature, leave the oleic acid which has been used and sold by this writer.

It is a pale brownish yellow, oily liquid, varying in depth of color between that of pale and ordinary sherry wine, sometimes as deep in color as almond oil, and it becomes slightly browner by age. Thus far it practically agrees with the Pharmacopœia description. But it is never neutral to test paper, but always acid, and it does not become rancid and acid to any considerable extent by any ordinary exposure. A specimen, exposed to the air in a shallow basin for two or three weeks, changed very little in sensible properties, and in its action on litmus paper. A little oxyoleic acid was present at first, and probably increased a little, but 1 cc. of 10 pc. solution of ammonia in 50 c.c. of water, shaken with 50 cc. of the oleic acid, deprived it of its acid reaction, both in that portion which had been exposed and that which had not. Therefore, the proportion of oxyoleic acid must be so small as to be insignificant, and yet is sufficient to give an acid reaction always.

This oleic acid is not "odorless or nearly so," but has a peculiar, distinct odor that is not that of rancid fat, but is suggestive of that odor, though it is not disagreeable to most persons, and the taste is like the odor, but it is not the acrid, almost pepper-like taste of rancid oils, though it gives a distinct after taste of acidity in the fauces. The s.g. compared with water at  $4^{\circ}\text{C.}$  is not "0.800 to 0.810," but is .8955 at  $15^{\circ}\text{C.} = 59^{\circ}\text{F.}$ , and .8896 at  $25^{\circ}\text{C.} = 77^{\circ}\text{F.}$  It is completely soluble in alcohol, but the other solubilities stated were not tried. "At  $14^{\circ}\text{C.} (57.2^{\circ}\text{F.})$ " it does not become semi-solid, but remains transparent at  $4^{\circ}$  to  $5^{\circ}\text{C.}$  It may not be of any great disadvantage to the oleic acid for medicinal uses, to leave in it the very considerable amount of palmitic, margaric or other acids of higher melting points permitted by this test, but the test simply rules out an oleic acid which has less of these other acids in it. The small proportion of oxyoleic acid doubtless lowers the solidifying point of all the fatty acids, but not to a very great extent. The oxyoleic acid is

also objectionable, therapeutically, because it is an irritant, and therefore there should be a limit set to the amount which is permissible.

The test given for the absence of more than traces of palmitic and stearic acid will never be satisfied by any oleic acid which the writer has ever seen which becomes semi-solid at  $14^{\circ}\text{C.} = 57\ 2^{\circ}\text{F.}$ , since all the solid portions at this temperature are margaric or palmitic acids. Another point which invalidates this test is that a soap made with a carbonated alkali as directed, without boiling, will always give a precipitate with acetate of lead, which will contain carbonate of lead, and this of course not being soluble in ether, would be accepted as palmitate or stearate of lead, when neither the one nor the other was present.

The principal differences between the oleic acid which has hitherto been used and that now required by the Pharmacopœia are, the odor, taste, acidity, specific gravity, and solidifying point. And the greatest of these differences is in specific gravity. All the others may be understood as being differences between a chemically pure acid and one that is less pure, and the question would be whether a chemically pure substance was needed for these external uses, after all the experience made with the oleates has been from an acid which, though of good quality, is not chemically pure. But the very great difference in specific gravity must mean more than this, and it led the writer to make the following investigations:

On referring to authorities, it was found that Gmelin quotes Chevreul as his authority, and gives  $\cdot 898$  at  $19^{\circ}\text{C.}$  Watt's Dictionary of Chemistry also quotes Chevreul, but gives  $\cdot 808$  at  $19^{\circ}\text{C.}$  In Wurtz Dictionnaire de Chimie, the article on oleic acid is written by P. Schutzenberger, and gives  $\cdot 808$  at  $19^{\circ}\text{C.}$  Other authorities seem to copy almost exclusively the latter figures, and the temperature being the same, it seems probable that all come down from Chevreul who wrote seventy years ago, and that some one has made a mistake. Allen, however, gives  $\cdot 900$  to  $\cdot 905$  for commercial oleic acid.

A specimen bottle of German oleic acid, from a very good maker, costing, wholesale, \$11 per pound, not labelled "C. P.", was carefully examined in comparison with the above-mentioned acid from red oil. It was of the color of pale sherry—not lighter than the best specimens from red oil—had the same peculiar odor and the same acid reaction. The s. g. under the same conditions of standard and temperature was  $\cdot 8923$  at  $15^{\circ}\text{C.} = 59^{\circ}\text{F.}$  and  $\cdot 8864$  at  $25^{\circ}\text{C.} = 77^{\circ}\text{F.}$ ; and it

answered all the other tests of the Pharmacopœia as well, but no better than the red oil acid, and in all probability it contained quite as much oxyoleic acid.

Cotton seed oil, olive oil, refined lard oil and almond oil were then each saponified, the soaps decomposed by tartaric acid, and the oleic acid separated from the other fatty acids in all, except the cotton seed product. This contained so little oleic acid that it was not separated.

The work was not done with critical accuracy, but only with practical accuracy, such as would be applied on a manufacturing scale, and the results were briefly as follows:

The olive oil gave an oleic acid which was almost-odorless, was neutral, and when sufficient palmitic acid was left in it, was semi-solid at  $14^{\circ}\text{C.}$ , but the proportion of palmitic acid to produce this was very considerable, so that a large proportion of the lead salt was insoluble in ether. The s. g. at  $15^{\circ}\text{C.} = 59^{\circ}\text{F.}$  was  $\cdot 9026$ ; at  $25^{\circ}\text{C.} = 77^{\circ}\text{F.}$  it was  $\cdot 8964$ . The s. g. was taken with enough palmitic acid in it to be not quite transparent at  $15^{\circ}\text{C.} = 59^{\circ}\text{F.}$

Refined lard oil of very good quality gave an oleic acid which was perceptibly different in some sensible properties from the acids from the olive and almond oils. The difference is, however, difficult to describe. It felt a little smoother and softer to the touch, and a little of it seemed to spread over greater surfaces, and it seemed that the hands became dry more quickly when wetted with it. Some comparative trials of the rate of absorption were made, but they were not accurate enough or definite enough to be stated. The lard acid was nearly odorless, but not tasteless, and gave the irritant acrolein-like impression or after-feeling in the fauces. It was neutral to litmus paper, and only lost its transparency when cooled to  $5^{\circ}\text{C.} = 41^{\circ}\text{F.}$  The s. g. at  $15^{\circ}\text{C.} = 59^{\circ}\text{F.}$  was  $\cdot 9041$ ; and at  $25^{\circ}\text{C.} = 77^{\circ}\text{F.}$ ,  $\cdot 8976$ .

The mixed acids from the almond oil when cooled to  $8^{\circ}\text{C.} = 46\cdot 4^{\circ}\text{F.}$ , and the oleic acid filtered out at that temperature, gave an acid of a rich, deep brownish yellow color, deeper than that of the oil from which it was made, and deeper than any of the other acids. It was nearly odorless and tasteless, and not quite neutral to litmus paper. It remained entirely transparent at  $4\cdot 4^{\circ}\text{C.} = 40^{\circ}\text{F.}$ , and was not cooled lower than this. Its s. g. at  $15^{\circ}\text{C.} = 59^{\circ}\text{F.}$  was  $\cdot 9100$ ; at  $25^{\circ}\text{C.} = 77^{\circ}\text{F.}$ ,  $\cdot 9039$ . This acid was then again saponified with caustic soda, and a lead salt made from it by decomposition with solution of acetate of lead. The washed lead salt was exhausted by ether, the



etheral solution filtered, and the ether distilled off in a water bath gradually heated to boiling, and boiled actively for half an hour. The acid was then of a pale yellow color, but had a fatty odor. Transferred to a flask which it filled to the middle of the neck to diminish contact with the air, it was then heated in a sand bath to  $210^{\circ}\text{C.} = 410^{\circ}\text{F.}$  At about  $100^{\circ}\text{C.}$  vapor was given off with the appearance of gentle boiling, and this boiling continued to the end of the heating, diminishing as the temperature arose, and had not entirely ceased, but nearly so, when the heating was discontinued. The vapor given off had at first a slight odor of ether, and afterward seemed to be mainly steam with a fatty odor. Toward the end of the heating a visible vapor came off with an odor suggesting acrolein, and as this evidence of decomposition became distinct and unmistakable, the heating was arrested before the bubbles of vapor had entirely ceased to arise from the bottom and sides of the flask. The flask was then corked and cooled. During the heating, which required about an hour and a quarter for about 150 grammes of the acid, the color became much deeper, so that the acid was much deeper in color than the original almond oil, and quite brown; and the volume was reduced by 5 to 8 p. c. (estimated). The s. g. at  $15^{\circ}\text{C.} = 59^{\circ}\text{F.}$  was  $\cdot 8984$ , and at  $25^{\circ}\text{C.} = 77^{\circ}\text{F.}$ ,  $\cdot 8917$ .

When cooled down to  $3\cdot 4^{\circ}\text{C.} = 38^{\circ}\text{F.}$  it congealed at the surface first, and during the congelation the temperature rose to  $5\cdot 2^{\circ}\text{C.} = 41\cdot 4^{\circ}\text{F.}$ , and the whole became a soft solid mass from which no liquid would flow.

A part of the same acid which had been saponified only once, as before-mentioned, the soap decomposed with tartaric acid in excess, and the resulting mixed acids separated by cold at  $8^{\circ}\text{C.} = 46\cdot 4^{\circ}\text{F.}$  when cooled remained perfectly transparent to  $2\cdot 5^{\circ}\text{C.} = 37^{\circ}\text{F.}$ , and then began to crystallize in distinct white groups on the sides and bottom of the flask. These groups were few and small, and the mass of acid did not crystallize at that temperature. It was therefore concluded that these small groups were palmitic acid crystallizing out. Each then stood for eight hours at a temperature of  $3^{\circ}\text{C.} = 37\cdot 4^{\circ}\text{F.}$  when the last portion was filled with crystals, though still liquid, and had a temperature of  $4\cdot 6^{\circ}\text{C.}$  The portion which had been resaponified, ether extracted and heated, was so nearly solid that the thermometer could only just be pushed through the mass, and its temperature was  $4\cdot 4^{\circ}\text{C.}$

The marked difference in s. g. of this acid, before and after the second

saponification, is doubtless partly due to the palmitic acid present in the first, and entirely absent in the last portion. But the boiling off of so much vapor in the heating of the latter portion, and the considerable reduction in quantity, leads to the inference that before heating the acid is a hydrate, and by heating parts with a molecule of water. If this be the case, the difference in s. g. before and after heating would be accounted for.

These data show conclusively that all the authorities referred to give a very erroneous s. g. for oleic acid, excepting Gmelin, while this, as well as the other authorities, quote from Chevreul; and it is not at all strange that the Pharmacopœia should have fallen into this very popular error. It seems pretty clear, too, how the error occurred. Some printer or copyist has probably made Chevreul's .898 into .808; not a difficult thing to do, especially when the old style figure 9 is used, as it may have been seventy years ago. It is rather curious that no redetermination of this s. g. has reached the prominent authorities referred to, since doubtless such redeterminations of so important a substance must have been often made.

The Pharmacopœia is, however, wrong in its temperatures of solidification, since by these it permits a large proportion of palmitic acid to be present in the oleic, and afterward gives a hypercritical test for excluding palmitic acid almost entirely.

Not one of the specimens of oleic acid made for this investigation was either pale yellow in color, or was nearly odorless or tasteless, and the after taste, in the fauces, was in all cases very pronounced.

The general practical conclusion reached here is that for medicinal uses a well prepared oleic acid from red oil is unexceptionable and should be continued in use, and the writer will still continue to use it, although he, with all others who do use it now, must state on the label that it is *not* the oleic acid of the U. S. P. of 1880. Then those who can get an acid which will answer the officinal tests will of course not take this, nor be liable to be deceived by it.

It is possible, and perhaps even probable, that oleic acid from animal fats is better for use in the animal economy than one from vegetable fats, for the same reason that ointments have always been made from animal fats rather than vegetable. But this has been neither proved nor disproved. It is, however, a more important question now than ever before, since the most important use of oleic acid now is, as a vehicle for the introduction of medicinal agents into the circulating



fluids within, to effect the general economy. As local agents for the treatment of external and local affections, such as diseases of the skin, the question of the most prompt and rapid absorption is of comparatively little consequence. But when quinia, morphia, mercury, etc., are to be introduced into the blood for general therapeutic effect, the most prompt and rapid absorption is very important. And, from this point of view, if the oleates are even moderately successful, as they now appear to be, their utility has as yet only begun to be realized in medicine.

The rapidity with which they are absorbed from the surface of the body is certainly very remarkable, and seems to vary very little in different portions of the skin, but varies very much in different conditions of health and disease. A moist skin, and especially the leaky skin of collapse, or of low vitality, and a sweating surface, absorb oleates badly or not at all; and from this condition to that of the very prompt absorption of health, there are, of course, all possible degrees of activity and inactivity.—*Ephemeris I*, p. 399-405.

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## VEGETABLE TALLOW FROM SINGAPORE.

BY E. M. HOLMES, F.L.S.,

*Curator of the Museum of the Pharmaceutical Society.*

Mr. R. Jamie of Singapore, in a letter accompanying some interesting donations lately presented by him to the Museum, has called my attention to this substance as possessing the valuable property of not readily turning rancid. He remarks concerning it: "The vegetable tallow never turns acid, and when the white kind is got, which is seldom, it makes very good ointment, simply with the addition of olive oil." At the ordinary temperature this tallow is a white friable solid, softening into a pasty condition when rubbed between the fingers and ultimately melting sufficiently to be rubbed in without leaving the hand very greasy. It has a very slight nutty odor and taste. It would seem therefore to be peculiarly suitable for camphor balls, suppositories and pessaries; for the latter its slowness in melting seems to peculiarly fit it.

Mr. E. Fielding at my request has made a few preliminary experiments as to its melting point and solubility in various solvents. He reports as follows: "At 65° F. it remains a little solid; between 82° and 104° F. it has the consistence of flour paste; it fuses at about

118° F., but remains transparent and liquid at 112° F. It is soluble in about an equal weight of cold ether; it is sparingly soluble in cold acetic ether and acetone, but very soluble in these liquids when heated, the greater part being precipitated on cooling; it dissolves in half its weight of cold chloroform, but mixes with one third of its weight of the same liquid when heated. In bisulphide of carbon, either cold or hot, it is extremely soluble. In cold benzol it is soluble to the extent of about 1 in 4. In hot benzol and petroleum spirit (hexane or heptane) it dissolves in all proportions, but the solution gelatinizes on cooling. It is very soluble in cold turpentine and dissolves in it when heated in all proportions. In alcohol it is soluble to the extent of about 1 in 30 when cold or 1 in 20 when hot, and in isopropyl alcohol it dissolves to the extent of about 1 part in 25 when cold, and 1 part in 4 when hot." Mr. Fielding thinks it may be compared in many respect with the fat of *Pentadesma butyracea* (*Clusiaceæ*), which should, however, judging from its natural order, be more nearly allied to kokum butter (*Garcinia purpurea*.)

According to a cutting from the *Java Bode* newspaper, sent to me by Mr. Jamie, the vegetable tallow, known as Minyak Tangkawang, or Minyak Sangkawang, is obtained from the seeds of one or more trees of the genus *Hopea*, found in the S. and E. division of Borneo, chiefly in the neighborhood of Qualla Kapuas, and on the west coast in the districts of Sambas and Mampawa. The Dyaks call the fat Kakawang and the tree which yields it Upu Kakawang. This tree is one of the giants of the forest. Several species of the genus appear to be used. Of these *Hopea splendida*, the Tongkawang Tonggul, is also called by the natives Dammar Tangkawang (because the bark yields a dammar.) The timber is used by the Dyaks for making their prahus, as it is proof against the influence of water. The bark also yields a red dye. This tree grows on alluvial fat clayey ground on the banks of great rivers. *Hopca aspera* grows on the higher mountain tracts, principally on the declivities of Mampawa, and is distinguished by the hairiness of the stems.

The preparation of the fat is very simple. When the ripe fruit falls on the ground, it is collected and allowed to germinate a little in a moist place. It is then dried in the sun until it becomes brittle. The fruit is then deprived of its shell and put into a rattan or bamboo basket suspended over boiling water. When it has been well steamed, the fruit becomes soft and plastic like dough. The fat is then expressed

by squeezing the doughy mass in a cloth and is poured into joints of bamboos, by which it receives the cylindrical form in which it is met with in commerce. Some Dyak tribes press the fruit by means of two beams. But it is probable that by neither of these processes is all the fat obtained.

The trees begin to yield when they are about eight or ten years old and the crops are somewhat irregular, but every four or five years an extraordinarily large crop may be counted upon, the fruit being ripe in December and January. According to "Spon's Encyclopædia" (p. 1413), about ten species of *Hopea*, yielding oil seeds differing much in size, are recognized by the natives of Borneo, three of these being common in Sarawak. The fat is also prepared in Java and Sumatra. By the natives the tallow is used for culinary and lighting purposes.

Although the tallow has not as yet been turned to account in pharmacy in this country, there is no reason why its fitness for medical purposes should not be experimented upon, the fat being a regular article of commerce. As far back as 1856, 651,586 kilos were imported into Singapore, and now several thousands of piculs go yearly to Singapore and are exported thence to England for use as a lubricating agent. For this purpose it has proved most valuable, especially for steam machinery, far surpassing even olive oil. In Manilla it has been employed in the manufacture of candles and found to be very valuable for this purpose. There are doubtless many other purposes in the arts to which the fat might be applied. It contains glycerin and about 95 per cent. of saponifiable matter which has less olein in it than animal fat. The tree is certainly also worthy of the attention of colonial planters since it yields fat, dye, timber and probably also resin, and the demand for the fat alone, when it is better known and prepared in a pure state, will probably far exceed the native supply.—*Phar. Jour. and Trans.*, November, 1883, p. 401.

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**Boracic Acid not Harmless.**—There is a case reported in *Schmidt's Jahrbücher* following the use of an injection of a four per cent. solution for chronic diarrhœa, and the Medical Record reports a death supervening upon its external use in an ulcer. The cases teach us that boracic acid is not so harmless as is usually supposed, and warn us to be cautious in its use, either pure, or in such combinations as borax, boro-glyceride, etc.—*Louisville Med. News.*, November 24, 1883.

THE PURGATIVE PRINCIPLE OF CROTON OIL.<sup>1</sup>

BY HAROLD SENIER,

*Fellow of the Institute of Chemistry and of the Chemical Society.*

In a paper read before this Society in March, 1878,<sup>2</sup> I pointed out that English pressed croton oil of undoubted genuineness could be separated by alcohol into two parts. The part soluble in alcohol was, or contained the vesicating principle, while the part insoluble in alcohol was entirely non-vesicating. Further experiments towards the isolation of this vesicating principle I have recorded in another paper. With respect to the other prominent property of croton oil, its purgative activity, I at that time was led by the opinion of therapeutists to believe either that this action was due to the vesicating principle or that it resided in the same portion of the oil—that portion soluble in alcohol; this, however, was not then determined. I now find that the purgative constituent does not exist in the alcohol-soluble vesicating oil, but is entirely in the alcohol non-soluble, non-vesicating oil. This I determined in the first place by experiments on myself and others, and more recently the therapeutic action of this oil has been studied by my friend Dr. J. W. Meek. My experiments consisted first, of the administration of the non-vesicating oil in doses of  $\frac{1}{10}$  minim, increased to  $\frac{1}{2}$  minim; if this oil contained the whole of the purgative principle, this quantity would be equivalent to about  $\frac{1}{5}$  to 1 minim of commercial croton oil. The oil used in these experiments was carefully freed from traces of the vesicating oil by repeated washings with alcohol until nothing more was dissolved. It was administered in the form of pills, and I found magnesium carbonate and extract of hyoseyamus convenient excipients. The general results from these experiments were, briefly, from the smaller doses a mild, and from the larger doses a powerful purgative effect, unaccompanied by any unpleasant symptoms. I supplemented these experiments by the administration of similar doses of the vesicating oil under similar conditions and obtained no purgative action, but a considerable amount of irritation in the alimentary canal accompanied by nausea.

In conclusion, I do not think I am exaggerating the practical out-

<sup>1</sup> Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, December 5, 1883.

<sup>2</sup> *Pharm. Journal*, [3], viii., p. 705.



come of these experiments when I say, that subject to the results of more extended therapeutic experiments, this non-vesicating croton oil, either in its present form or in the more concentrated form in which I hope to obtain it furnishes a useful, safe, speedy and pleasant purgative.

Dr. Meek describes the result of the experiments conducted by him as follows :

*Report on the Physiological Action of the Non-vesicating Portion of Croton Oil.*

BY JOHN W. MEEK, M.D.; LOND.

In order to try the physiological effects of the non-vesicating portion of croton oil, Mr. H. Senier was good enough to supply me with some of that portion of the oil as isolated by him. It was made into the form of pills with extract of hyoseyamus.

Given to healthy adults in doses containing the non-vesicating portion of one-tenth of a minim of ordinary croton oil, beyond slight nausea and some sense of discomfort no appreciable effect was produced; but I found that doses containing the non-vesicating portion of half a minim of croton oil acted as a powerful purgative in from three to six hours from the time of administration. In some of the cases the oil caused griping, but not in all. The motions were usually of a loose character, though not containing a large amount of fluid. The bowels were usually opened two or three times at intervals of an hour or more between each action.

In the doses above mentioned, beyond the action on the alimentary canal, no other physiological effect was observed in any of the cases. —*Pharm. Jour. Trans.*, Dec., 1883.

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## THE VESICATING PRINCIPLE OF CROTON OIL.<sup>1</sup>

BY HAROLD SENIER,

*Fellow of the Institute of Chemistry and of the Chemical Society.*

In a former paper<sup>2</sup> I gave the results of an investigation into the action of alcohol on croton oil, and found that under certain conditions it separated the oil into two parts; the one part vesicating, the other non-vesicating. I briefly described the vesicating oil and also the non-vesicating oil, which I have since shown to be purgative.

<sup>1</sup> Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, December 5, 1883.

<sup>2</sup> "Pharm. Jour. and Trans.," March 9, 1878.

In another paper I have given the results of my work, so far, on this purgative oil. In this paper I show, in the first place, more exactly what the conditions are which affect the solubility of croton oil in alcohol, maintaining and extending my previous conclusions. In the next place, I proceed to determine whether the oil soluble in alcohol is itself the vesicating principle, or what part of it has that power.

*The Solubility of Croton Oil in Alcohol.*—When alcohol (sp. gr. .794 to .800) is mixed in equal volumes with English pressed croton oil, perfect solution takes place, the mixture being permanent at all ordinary temperatures, and this is equally true when any less quantity of alcohol is used. When, however, the proportion of alcohol to croton oil becomes as seven volumes to six, or any larger proportion of alcohol, then a part of the croton oil separates. This part varies in quantity, in the case of different samples of oil, in accordance with the conditions noted in my former paper. It is an interesting fact that that portion of the croton oil which separates when the alcohol is in excess is afterwards insoluble in any proportion of alcohol. But that portion of the oil dissolved by alcohol is, when separated, soluble in all proportions.

In the discussion following my former paper, Professor Redwood remarked on an apparent discrepancy between my results on this point and some experiments made by himself some years previously.

In the experiments reported by Professor Redwood, croton oil and alcohol were used in equal volumes only and found perfectly miscible. This result, so far as it goes, agrees exactly with my own, and no doubt if Professor Redwood had employed other proportions than those given his results would also have coincided with mine. The usual statements regarding the solubility of croton oil in alcohol as found in many text-books, and incidentally revived by Mr. A. H. Allen in his recent paper on "The Chemistry and Examination of Fixed Oils"<sup>1</sup> are shown by my experiments to be inaccurate.

*Search for the Vesicating Principle.*—Some of the characters of the alcohol-soluble croton oil, which has been shown to contain the vesicating principle I have described in the previous paper, to which reference has already been made. The more important of these characters, together with others since observed, are as follows:—At 60° F. this oil is of a brown color, and holds in suspension a number of acicular crystals soluble on warming. It has a strong characteristic smell of croton oil, a persistent burning taste, and readily produces pustules

<sup>1</sup> "Jour. Soc. Chem. Ind.," February 28, 1883.



when applied to the skin. It has an acid reaction and a sp. gr. of .987.

Solvents were first tried as a means of further separation. Water, alcohol of various strengths, benzol, chloroform, ether, petroleum naphtha, etc., were tried, at different temperatures and in various proportions, but the results did not indicate a method of further separation. The oil was then subjected to distillation, alone, with acids, alkalies, and by the passage through it of heated steam. Several distillates were thus obtained, but they were all non-vesicating. The oil therefore contains no free volatile vesicating principle, neither does the vesicating activity exist in a combined volatile alkaloid or alcohol.

To determine whether the fatty acids or alcoholic radical contained the vesicating principle, the oil was subjected to saponification, first of the free fatty acids. 50 grams of oil were digested on a water-bath for one hour, with  $12\frac{1}{2}$  grams of sodium bicarbonate and 10 grams of water. The resulting soapy mass was agitated with petroleum naphtha, and the whole placed on a filter and repeatedly washed with the same solvent. The filtrate containing the unsaponified neutral oil, when evaporated and dried, weighed 38.7 grams; the difference, representing free fatty acids, being 11.3 grams or  $22\frac{1}{2}$  per cent. of the alcohol-soluble oil. The soap left on the filter was diffused in hot water and decomposed with sulphuric acid. The free fatty acids which separated in white flocculi were collected and washed, dissolved in alcohol and crystallized. In this state their melting point indicated fairly pure palmitic acid, which was devoid of any vesicating property. The vesicating activity does not, therefore, reside in the free fatty acids.

Returning now to the neutral oil, this was saponified by 10 grams of caustic soda and 20 grams of water. The soap on cooling rose to the top as a hard cake, from which the aqueous solution containing the alcohol radical was easily separated. This on concentration gave no evidence of containing any vesicating principle. The soap was diffused in hot water, decomposed with sulphuric acid, and the free fatty acids separated. The soap previous to decomposition had no tendency to vesicate, but the free acids when liberated were strongly vesicant.

It was now evident that the vesicating principle was among the fatty acids; the next experiments were directed, therefore, to their separation. This has at present been accomplished only in an approximate manner, but the subject presented so many difficulties that it seemed advisable to publish the results so far obtained.

Many processes were applied to the separation of these acids, which

after much time and careful working gave only negative results. The description of these I shall omit. The following gave the only results from which even general conclusions could be drawn:—First, separation by means of the different congealing points of the glycerides of the fatty acids. Second, separation by means of the different solubilities of their lead salts in alcohol and ether. Third, separation by fractional saponification. Fourth, separation by fractional decomposition of the soda salts. The first of these separations was accomplished by filtration and slight pressure through a plug of tow in a jacketed funnel surrounded by refrigerating mixtures. The manner of accomplishing the other three separations does not require a special description.

The conclusions from the results of these processes were briefly as follows:—First, the vesicating principle is contained in those acids having the lowest melting points. Second, the lead salt is soluble in ether, but not at all, or very slightly, in alcohol. Third, it is contained in those acids least readily saponified by alkalis. Fourth, it is contained in those acids first liberated when the alkali soap is decomposed by acids.

In the next experiment the acids were separated into four groups, as follows:—First, those having ammonia salts insoluble in alcohol (palmitic acid). Second, those (after removal of group 1) which are precipitated from alcoholic solution by magnesium acetate. Third, those which, in the absence of groups 1 and 2, are precipitated as insoluble barium salts in alcoholic solution (oleic, etc.). Fourth, those whose barium salts are soluble in alcohol. The fatty acids were dissolved in alcohol and saturated solutions of the reagents were added. The precipitate in each case was washed on a filter with cold alcohol. The yield of acids in each group was, in round numbers, group 1, 15 per cent.; group 2, 20 per cent.; group 3, 40 per cent., and group 4, 25 per cent. of total fatty acids in the neutral alcohol-soluble croton oil. The acids of groups 1, 2 and 3 were entirely inactive as regards vesicating effects, but those separated in group 4 were highly vesicant. These acids when separated are of a dark brown color, and remain liquid at 50°F. They may be further purified by saponification with plumbic oxide, solution of the soap in ether and regeneration with an acid. In this state they are rendered much more active. Taking into consideration the low melting point and the solubilities of the metallic salts, together with the results of the experiments on the separation of

the acids by the different congealing points of their glycerides and by their partial saponification, I think it more than probable that this new acid will be found to be closely allied to oleic acid and its analogues ricinoleic and linoleic.

In conclusion, I have shown, first, what the conditions are which obtain in the separation of croton oil by alcohol into its vesicant and purgative parts. Secondly, the vesicating activity of the alcohol-soluble croton oil I have proved not to exist in the free acids and not to belong to any basic constituent, but to reside in the combined non-volatile fatty acids. These have been separated to a considerable extent, if not to complete isolation, and the probable position of the new acid in the fatty acid series I have indicated. The further elucidation and study of the new acid I reserve for a future communication.  
—*Phar. Jour. and Trans.*, Dec. 8, 1883.

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## NAPHTHOL: ITS MEDICINAL USES AND VALUE.

In a paper under this title, read before the Philadelphia County Medical Society on October 17th., by Dr. John V. Shoemaker, Physician to the Philadelphia Hospital for Skin Diseases, that distinguished dermatologist calls attention to naphthol in a manner calculated to ensure for that drug a more extensive trial by the profession of the United States, than has yet been accorded it.

Naphthol is a derivation of naphthalene, a hydrocarbon found in large quantities in coal tar, belonging to the so-called aromatic group. It bears the same relation to naphthalin that phenol does to benzol, and cresol to toluol. It was first employed by Professor Kaposi as a substitute for tar in skin diseases, being considered by him as the essential curative ingredient of that substance, while being free from its objectionable features. The preparation employed in the cases which form the basis of Dr. Shoemaker's report was that made after the method of Dr. Justus Wolf, being free from odor and coming in beautiful crystalline scales. This preparation decomposes under the influence of heat when it again becomes odorous and pungent. The commercial naphthol contains impurities which unfit it for use in medicine. Naphthol thus properly purified is an extremely powerful antiseptic and disinfectant. One part added to 480 of urine kept the latter from decomposing for six months, while another sample of the same urine

to which naphthol was not added had a strong putrid odor at the end of eight days. The addition of the naphthol to this putrid sample divested it of all odor within twenty-eight hours.

Dr. Shoemaker's therapeutic experiments extended through some nine months and sufficed to convince him of the great value of naphthol in medicine.

He found it to fully sustain the claim that Kaposi had made for it in scabies, psoriasis and chromophytosis, as well as in some of the chronic forms of eczema, in which it not only allayed the itching attendant thereon, but lessened the infiltration as well. In wounds and indolent ulcers it is a most useful detergent and deodorant, removing the fetor and establishing healthy action of the parts. Aqueous solutions, containing half grain to the ounce, were used to great advantage as vaginal injections, especieally in leucorrhœa and uterine carcinoma, as well as in gonorrhœal affections, both in male and female. In diphtheritic throat affections it made a most useful gargle, as well as to remove the fetor of catarrhal and other affections of the buccal cavity. Its greatest value, however, arose from its disinfectant action on the evacuations of fever patients and in rooms containing them, while by its absence of odor it did not tend to produce inconvenience either to patient or attendants. Combined with powdered talcum or starch, or both, and dusted into the shoes or stockings of those affected with fetid exhalations of the feet it acts most satisfactorily, and its effects are equally as good in the same affection involving the hands, axillary and inguinal regions. Combined with other ointments in the porportion of from one to ten grains to the ounce, it not alone preserves the unguent from decomposition, but exerceises also an antiseptic action on the parts and the exudation therefrom. A slight admixture to an experimental sample of lard preserved the same in excellent condition throughout the hot summer months. In chronic psoriasis, particularly when there is great infiltration, a five to fifteen per cent. ointment was frequently attended with good results. It also proved very effective in squamous and fissured eczema, used in combination with lard or gelatin.

After his long and successful employment of naphthol Dr. Shoemaker was surprised to find that serious untoward effects had been reported from its use by foreign authors. With a view to further testing its toxic properties he first administered it to a rabbit internally in a saturated solution. But on discovering no injurious effect he selected another rabbit which he determined to poison with a view to observing



the *post-mortem* appearances. He accordingly gave it at first one-grain pills of naphthol every three hours, and subsequently increased the amount to two grains and again to four grains at the same intervals. But beyond increasing the animal's appetite no effects were apparent. Following these experiments two of his assistants took numerous and large doses (reaching as high as five grains twice a day) without other effect than a sensation of temporary warmth in the epigastric region after each dose and subsequent slight vertigo and buzzing of the ears, with other evidences of hyperæmia. The alvine evacuations were softened to a mushy consistence and changed to a clay color; in one instance diarrhœa occurred. The deduction from these experiments clearly is that in the case of the ill effects reported an impure preparation had been employed.

Dr. Shoemaker pronounces purified naphthol to be far superior to carbolic acid and the other antiseptics which have been in vogue, while it is almost absolutely odorless. It has the advantage also of being cheaper than carbolic acid, when the amount required to produce its effect is considered.—*Phar. Jour. and Trans.*, Dec. 1, page 430.—*Therap. Gazette*, Nov., 1883.

## CONTRIBUTION TO THE PHARMACY OF THE POMEGRANATE.

BY LOUIS SIEBOLD.

*Read before the British Pharmaceutical Conference.*

The great value of the root-bark of *Punica Granatum* as a remedy for tapeworm is so well established as to need no comment. It is well known, however, that the administration of this drug often results in failure on account of the extremely nauseous astringent taste of its decoction and its consequent rejection by the stomach, a fact which renders it almost useless for ladies and children. The usual way of meeting similar objections in other cases, by substituting the active principles for the crude drug, does not seem to promise well in this instance, owing to the difficulties attending the isolation of these principles in a pure state and their proneness to decomposition (see C. Tanret's researches on pelletierine and the other alkaloids of the pomegranate, abstracted in the "Year-Book of Pharmacy," 1878, p. 43; 1879, p. 38; and 1880, p. 64.) The question then arises, whether it is possible to produce, by a comparatively simple process, a pharmaceu-



tical preparation of this bark, which, while possessing the full activity of the drug, is at the same time free from the nauseous taste and the unpleasant effects alluded to. Such a preparation, I believe I have succeeded in making. I do not wish to trouble the meeting with the various steps taken in working out the problem, nor with particulars of unsuccessful experiments in the direction indicated, but will at once lay before you the details of the process finally adopted.

Six ounces of the coarsely powered root-bark are digested three successive times with 48 fluidounces of water at 160° F., previously acidified with a few drops of acetic acid, each time for about twelve hours, during which the mixture should be frequently agitated and the temperature maintained at or near the point given. The strained infusions, measuring in all nearly 140 fluidounces, are united, and gradually mixed with solution of sugar of lead until no further precipitate is formed on testing filtered portions; the whole is then filtered, the slight excess of lead removed from the filtrate by a current of washed sulphuretted hydrogen, the mixture warmed for some time to expel the excess of the gas and again filtered, and the perfectly clear liquor evaporated on a water-bath to the consistence of a syrup, at a temperature not exceeding 140° F. Evaporation *in vacuo* would probably be better still; but this I have not tried. Finally the small quantity of residue left is mixed with syrup of orange peel sufficient to produce a draught of about 2 fluidounces. This draught represents a dose for an adult, and should be taken at once, first thing in the morning, the patient abstaining from food and keeping quiet for about four hours after the administration. A diet of meat and fish, without bread or farinaceous food of any kind, should be observed for the two days preceding the cure, and on the last day no food whatever should be taken after dinner. During this afternoon it is also advisable to clear the bowels by means of a mild purgative; if then the draught be taken at about two or three o'clock the following morning and sleep again resorted to after its administration, the patient will have done all he can to ensure success.

In eight out of nine cases in which the efficacy of this preparation was tested, the entire tapeworm was expelled within five hours after the consumption of the draught, and in one case only success was not complete. The eight cases comprise three of *Tenia solium*, and five of *T. mediocannellata*. In one of the latter instances not the slightest care as regards diet was observed, and, contrary to all instructions, the

patient took a heavy supper the night before the administration of the draught, and yet the entire worm was expelled. In all the eight cases, various tapeworm remedies had been tried previously, decoction of pomegranate root-bark being also among those employed without success, the head of the worm remaining, although the decoction in the cases alluded to was retained by the patient. It would thus appear that the preparation I have described, in addition to being free from all objectionable taste, may also be superior to the decoction of the bark in point of activity, owing, probably, to the entire absence of astringent principles, the abundant presence of which in the decoction is not unlikely to counteract the effect of the anthelmintic constituents.

The preparation obtained as above has a pleasant fruity flavor and is readily borne by the stomach. The most fastidious patient would take it without the slightest difficulty. The value of such a preparation appears to me the greater from the fact that all tapeworm remedies of repute share the nauseous taste and sickening effects of the decoction of pomegranate bark.

While admitting that the cases in which this new preparation has thus far been put to the test are yet not great in number, I think I am justified by the results in inviting the best attention of medical practitioners on the one hand, and of pharmacists on the other, to this subject. Those who are fully acquainted with the numerous failures in the treatment of cases of tapeworm by even the most renowned remedies, must long since have felt the want of a preparation combining efficacy with freedom from all unpleasant taste.—*Phar. Jour. Trans.*, November 17, 1883.

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## NOTES AND SUGGESTIONS UPON TINCTURE OF NUX VOMICA.

BY WYNDHAM R. DUNSTAN,

*Assistant Lecturer in Chemistry and Physics to the Pharmaceutical Society and Demonstrator of Practical Chemistry in the School of Pharmacy; and*

F. W. SHORT,

*Assistant Demonstrator of Practical Chemistry in the School of Pharmacy.*

In a former paper we have shown by analysis that commercial tinctures of nux vomica vary considerably in alkaloidal strength (see "Amer. Jour. Phar.," 1883, p. 579). This difference is no doubt in the first instance due to a variation in the amount of alkaloid contained in the seeds of *Strychnos nux vomica* now in commerce, the existence of

which we have already proved in a previous communication to this Society (see "*Amer. Pharm. Jour.*," pp. 268 and 467). There are, however, other possible causes which might contribute to the inconstant result. Foremost among these is the possibility of alcohol containing more water than rectified spirit having been employed in the manufacture of the tincture; this conjecture might appear to be supported by a relation which is noticed in the table of analyses published in our previous paper upon this subject. For it is here observed that in certain cases high specific gravity is associated with a large percentage of alkaloid. The important assumption underlying this conjecture is that a dilute alcohol extracts more alkaloid than a stronger alcohol; but, as far as we can discover, this has never been experimentally substantiated. Nevertheless, various suggestions based upon this assumption have been made for the employment of a weaker alcohol than rectified spirit for the preparation of the tincture, and some of these suggestions have been adopted in foreign pharmacopœias.

In order to determine by direct experiment the extractive power of alcohol of different strengths the following experiments were made. Five gram quantities of *nux vomica* in impalpable powder were macerated for three days with 50 cubic centimetres of alcohol containing different proportions of water, the mixtures being frequently agitated. Maceration was adopted, because percolation with alcohol containing more water than proof spirit is rendered practically impossible owing to swelling of the seeds and consequent clogging of the percolator, occasioned by the action of the water upon the mucilaginous constituents, and it was deemed important that the experiments should be strictly comparative. And further, had ordinary percolation been adopted and a larger amount of alkaloid been found to be extracted by the weaker spirit, there would be the alternative that this was due, not to the greater solubility of the alkaloidal salts in the weaker spirit, but to the longer time during which the seeds were in contact with this spirit, for with *nux vomica* the rate of percolation is inversely as the quantity of water present. After maceration forty cubic centimetres of the tincture were filtered off and the amount of total alkaloid determined by a process which has been described in general outline in our former paper upon tincture of *nux vomica*.

In detail the process is as follows: The quantity of tincture to be estimated, usually 50 grams, is evaporated almost to dryness upon the water-bath in a beaker; to this residue 25 cc. of chloroform are added,

but inasmuch as the residue will not dissolve in chloroform alone 15 cc. of dilute sulphuric acid (5 per cent.) are added, and the mixture is poured, after gently warming, into a separating funnel, well shaken, and the chloroform run off; the latter is extracted with a little more acid if necessary. The acid liquid, which contains the alkaloid, is rendered alkaline with ammonium hydrate and agitated with 15 cc. of chloroform, which is separated and filtered if necessary. The alkaline liquid is again shaken with chloroform and the latter run off. The mixed chloroformic solutions, which should be perfectly clear, are evaporated to dryness upon the water-bath, and after exposure for one hour at this temperature the residue of total alkaloid is weighed.

In many cases the residue from the evaporation of the tincture may be directly dissolved in dilute sulphuric acid, the liquid rendered alkaline with ammonium hydrate and the alkaloid extracted with chloroform. In certain cases, however, the alkaloid obtained in this way contains a trace of coloring matter, but a perfectly pure residue is obtained by the method described at length above.

The following table shows the results of the experiments :

TABLE I.

Proportion of rectified spirit to water (by volume).	Quantity of total alkaloid in 40 cc. of tincture.	Percentage of total alkaloid extracted from the <i>nux vomica</i> .
100 : 0 (rectified spirit)	0·078	1·95
100 : 25	0·088	2·20
100 : 33	0·088	2·20
100 : 50	0·089	2·22
100 : 60 (proof spirit)	0·086	2·15
100 : 100	0·074	1·85

The mares from these tinctures were found in all cases to be distinctly bitter, and hence in no case had the exhaustion been complete. The above results show that water mixed with rectified spirit in any proportion up to and including proof spirit extracts more alkaloid than rectified spirit alone; but when the water rises above the proportion contained in proof spirit the extractive power for alkaloid again diminishes. The obvious conclusion to be drawn from these experi-



ments is that proof spirit should be substituted for rectified spirit in the preparation of tincture of nux vomica. But there is one strong reason for suggesting the use of 100 volumes of rectified spirit mixed with 25 volumes of water. For although the extractive power of these two spirits may be said to be the same, the use of the stronger spirit has this advantage over proof spirit, that it percolates very much more freely, while, owing to the larger proportion of water in the proof spirit, the percolation occupies a much longer time and the percolator is very apt to clog.

Rother (see "*Amer. Jour. Pharm.*," lv., 1; "*Pharm. Jour.*" [3], xiii., 643) has proposed the use of sodium chloride in the preparation of tincture of nux vomica, claiming that more complete exhaustion is by this means obtained; but this statement is not supported by any alkaloidal determinations. We have therefore experimentally studied the influence of sodium chloride upon the extraction of nux vomica by alcohol. Rother recommends the use of spirit the strength of which is represented by equal volumes of rectified spirit and water; but in view of the results obtained above, we have employed 100 volumes of rectified spirit to 25 volumes of water.

Five grams of nux vomica were macerated for three days with 50 cc. of spirit containing 100 volumes of rectified spirit and 25 volumes of water, in which was dissolved 0.7 gram of sodium chloride. Three experiments were made. In the first experiment the maceration was continued for two days; in the second and third experiments for three days. The results are recorded in Table II.

TABLE II.

Proportion of rectified spirit to water. (By volume.)	Percentage of Na Cl dissolved in spirit.	Amount of total alkaloid in 40 cc. of tincture.	Percentage of alkaloid extracted from the nux vomica.
100 : 25	1.5	0.087	2.18
100 : 25	1.5	0.102	2.55
100 : 25	1.5	0.100	2.50

As maceration is but an imperfect process of exhaustion, two experiments were made by percolation, spirit of the above strength being employed in one experiment and the same spirit containing 1.5 per cent. of sodium chloride in the other. Five grams of the finely powdered seeds being percolated with 50 cubic centimeters of the spirit. The results are shown in Table III.

TABLE III.

Proportion of rectified spirit to water. (By volume.)	Percentage of Na Cl dissolved in spirit.	Amount of total alkaloid in 50 cc. of tincture.	Percentage of alkaloid extracted from <i>nux vomica</i> .
100 : 25	0·	0·125	2·5
100 : 25	1·5	0·130	2·6

In the first experiment the marc was slightly bitter, but in the second, where sodium chloride was used, the marc was entirely free from bitterness, indicating complete exhaustion. It will be seen from these experiments that a spirit made by the addition of 25 volumes of water to 100 volumes of rectified spirit extracts nearly the whole of the alkaloid from *nux vomica* when used in the proportion of 1 of *nux vomica* to 10 of the spirit. When sodium chloride to the extent of 1·5 per cent is dissolved in spirit of the above strength the whole of the alkaloid is withdrawn from the seeds, the sodium chloride no doubt acting, not chemically as Rother maintains, but physically, by softening and dissolving the albuminous matter of the seeds, as it is known to do in other cases. As the ultimate gain effected by the use of sodium chloride is but small, it becomes a question for consideration whether it should be adopted in practice.

It has frequently been suggested that tincture of *nux vomica* should be prepared by dissolving a definite quantity of extract of *nux vomica* in alcohol. Apart from any practical difficulties that may stand in the way of this suggestion, it is based upon the supposition that extract of *nux vomica* is a product of definite alkaloidal strength, and therefore that when a tincture contains a known quantity of the extract it may be considered as uniform in action and composition. This supposition, as we shall subsequently prove, is entirely erroneous, extract of *nux vomica* being in reality very variable in alkaloidal strength, just as the tincture is, when prepared in the ordinary way. The new edition of the United States Pharmacopœia contains a process for making tincture of *nux vomica* constant in the amount of extract which it contains. But, it appeared to us that, having an extract known to contain a definite quantity of alkaloid to work with, there would be a distinct advantage other things being equal, in preparing the tincture from such an extract. We therefore made experiments to determine whether by any simple means an extract of *nux vomica* could be prepared that

would wholly dissolve in alcohol, forming a solution that would not deposit upon keeping.

*Experiment 1.*—An extract of *nux vomica* was prepared with rectified spirit and evaporated upon the water-bath until it had the consistence of a soft extract. Ten grains of this were dissolved with the aid of a gentle heat in one ounce of rectified spirit, by which means a perfectly clear solution was obtained, but in twenty-four hours this had deposited a white sediment.

*Experiment 2.*—An extract was prepared in the same way as in experiment 1, but ten grains were dissolved in one ounce of a mixture of two volumes of rectified spirit and one volume of water with the aid of a gentle heat. A large quantity of oily matter refused to dissolve and the tincture soon deposited a copious yellow sediment.

*Experiment 3.*—The same extract was used as in the former experiments, but the solution of ten grains was attempted with one ounce of proof spirit. Some oil remained insoluble and the tincture deposited abundant yellow sediment.

*Experiment 4.*—The extract was prepared with rectified spirit, evaporated upon the water-bath, and exposed for eight hours. Ten grains of this extract dissolved readily in one ounce of rectified spirit, but the tincture deposited a small quantity of brown sediment.

*Experiment 5.*—The extract in this case was prepared with proof spirit and evaporated to a soft consistence. Ten grains of this were dissolved in one ounce of proof spirit, yielding a nearly clear tincture, which deposited very slightly after twenty-four hours.

The above experiments indicate that there is no very ready means of obtaining a perfectly stable tincture of *nux vomica* from the solution of the extract in alcohol, although experiments 4 and 5 might possibly be modified to yield good results. However, we are now engaged in elaborating a simple and direct method of preparing tincture of *nux vomica* of definite strength upon different lines, and hope to bring our results before this Society at a future meeting.

Our thanks are due to Professor Attfield, F.R.S., for having permitted this investigation to be carried out in the laboratories of the Pharmaceutical Society, and to the British Pharmaceutical Conference for having aided the work by a grant from its Research Fund.—*Phar. Jour. Trans.*, Dec. 1883.

## ON EXTRACT OF NUX VOMICA.

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and Demonstrator of Practical Chemistry in the School of Pharmacy;*

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The only analysis, as far as we know, that has been published of extract of nux vomica is that made by Dragendorff,<sup>1</sup> who records that he found in one sample of the extract 7.3 per cent. of total alkaloid, and in another 8.5 per cent. Our first experiments upon this subject were directed to the discovery of a simple and accurate method for the estimation of the total alkaloid in the extract. In a previous paper ("Phar. Jour." [3], xiv, 292) we described a process of this kind for the determination of the total alkaloid in tincture of nux vomica, which consisted in evaporating the tincture to dryness, and then dissolving the residue in a mixture of chloroform and dilute sulphuric acid. We first tried a similar process in the case of the extract, but it was found that although the commercial extract was wholly dissolved by the above mixture, the alkaloid subsequently extracted by chloroform, after the addition of ammonium hydrate, was slightly impure.

We therefore made further experiments, which led to the adoption of the following process: About one gram of the extract is dissolved in a strong solution of sodium carbonate with the aid of a gentle heat. This solution is extracted with two consecutive 15 cc. of chloroform. The mixed chloroformic solutions are extracted with two consecutive 15 cc. of dilute sulphuric acid (5 per cent.), and from the mixed acid solutions, which should be filtered if necessary, the total alkaloid is extracted after the addition of ammonium hydrate by agitation with chloroform, two separate quantities of 15 cc. being generally sufficient. The clear chloroformic solutions are evaporated to dryness upon the water-bath, and the residue of total alkaloid weighed after exposure for one hour. The alkaloidal residue thus obtained was shown to be pure by applying the ammonia-tannin process, which we have fully described in a former paper. The following is a typical result: ( $\alpha$ )

<sup>1</sup> "Die Chemische Werthbestimmung," p. 72.



amount of alkaloid originally found; ( $\beta$ ) amount of pure alkaloid obtained by ammonia-tannin process.

$$\alpha=0.164.$$

$$\beta=0.161.$$

Twelve commercial specimens of extract of nux vomica were now analyzed, the total alkaloid being estimated in the manner above described and the strychnine by a method of precipitation as ferrocyanide, which we have described at length elsewhere (*"Pharm. Journ."* [3], xiv, 290); the brucine was estimated by difference. In addition the quantity of "moisture" indicated by the loss at 100°C. has in all cases been determined. The results are recorded in the following table:

*Analyses of Extracts of Nux Vomica.*

No.	Percentage of moisture.	Percentage of total alkaloid.	Percentage of strychnine.	Percentage of brucine.
1	16.7	15.15	6.63	8.52
2	19.7	15.64	7.44	8.20
3	15.5	10.32	4.19	6.13
4	15.7	15.16	7.08	8.08
5	16.0	12.49	5.53	6.96
6	13.9	12.53	5.17	7.36
7	13.8	12.25	4.87	7.38
8	17.8	17.54	7.52	10.02
9	13.6	15.78	6.41	9.37
10	16.0	15.94	6.81	9.10
11	17.3	16.24	5.81	10.43
12	15.9	17.12	8.58	8.51

It will be seen that, just as in the seeds and tincture, so in the commercial extracts of nux vomica, our analyses indicate a serious want of uniformity in the alkaloidal content. This variation in the extracts might arise at least from two causes: (1) the difference in alkaloidal content among the seeds of commerce; (2) the practice, which might appear from some observations subsequently recorded to be far from uncommon, of removing the oil which separates during the manufacture of the extract.

When an alcoholic tincture of nux vomica is evaporated a comparatively large quantity of oil separates as the evaporation proceeds, for this oil, while soluble in alcohol, is insoluble in water. Now, an examination of the oil separated in this way has shown us that it contains alkaloid, both strychnine and brucine, and hence its removal from the extract, in any case illegitimate, is accompanied by abstraction of alkaloid and consequent diminution in the total content. The presence of oil in an extract may easily be detected by warming with water or dilute alcohol, and upon cooling the oil will separate and float upon the surface of the liquid. Some of the commercial extracts, the analysis of which has been given above, failed to yield more than a mere trace of oil when tested in this way. This may be due either to the abstraction of oil during manufacture or to the use of a very dilute spirit in the preparation of the extract. We have found that an extract prepared in the latter way contains little oil. If the absence of the oil is due to this second cause, and a spirit about the strength of proof spirit has been employed in the manufacture of the extract, from results published in our foregoing paper more alkaloid should be extracted in this way. In the case of one of the extracts examined, namely, that which is richest in total alkaloid, this would seem to be the case, for we found that this extract contained no oil; although this result might have been brought about by the actual removal of the oil during manufacture, the quantity of oil removed being large in proportion to the small quantity of alkaloid which it contains. The actual method of manufacture being unknown to us, the truth of these conjectures must necessarily be uncertain; but, be the cause what it may, we have shown beyond doubt that there is a serious want of uniformity both in the extracts and in the method of their preparation. In a future communication we shall hope to bring forward a simple and direct method for the preparation of an extract of nux vomica which shall be constant in alkaloidal strength.

We are indebted to Professor Atfield, F.R.S., for allowing the work connected with this investigation to be carried on in the laboratories of the Pharmaceutical Society, and have also to acknowledge a grant from the Research Fund of the British Pharmaceutical Conference in its aid.—*Phar. Jour. and Trans.*, Dec. 8, 1883.

## ACONITINE FOR INTERNAL ADMINISTRATION.

BY T. B. GROVES.

*Read before the British Pharmaceutical Conference.*

From a perusal of an article "Preparations of Aconite," in No. 5, vol. i., of Dr. Squibb's *Ephemeris*, it would appear that aconite plays a more important part in medication on the other side of the Atlantic than it does in this country. Here the admitted uncertainty of action both in degree and kind of the official preparations of the drug seems to have had the effect of dismissing both drug and preparation from the medical armory: there, on the contrary, this feeling serves but to stimulate research with the view of providing for medical practitioners a trustworthy preparation of a drug of admittedly high value. Pharmacists cannot but feel greatly indebted to Dr. Squibb for his able article on the subject, although his conclusions may not meet with universal acceptance. In fact, it seems to me that to decide, after all the labor that has been expended on the chemistry of the aconite alkaloids by Wright, Duquesnel, and others, on recommending for internal use a fluid extract of a root that varies so greatly in activity, is a distinct retrogression in pharmacy tending to render useless a vast amount of original research conducted with unusual care and completeness. It is true that Dr. Squibb has indicated a method of estimating by the sense of taste the quality of the root, but such a method, crude in extreme as it must be in any case, would be unable to distinguish between roots differing widely in their chemistry and physiology, like *A. Napellus* and *A. ferox*. In fact, the latter, owing to the less amount of acrid resin it contains, would give a less marked result than its less potent congener. It is not pretended that the subject has been exhausted. New varieties of root have from time to time made their appearance in the market, and though the chemist has essayed to perform his part in their examination, he has not been adequately seconded by the experimental physiologist. The legal difficulties in the path of inquiry in this direction may well account for the apparent and probably only apparent lack of interest among the medical profession in a class of remedies so potent for good or evil as the various alkaloids of the genus *Aconitum*.

Practically we may, I think, limit our attention to one species only of the toxic aconites. *A. Napellus* is that which has, I believe, been

invariably ordered in the manufacture of what may be termed crude aconite preparations for internal use, and it is to it that the text-books refer when treating of the physiological properties of aconite. Its alkaloid, nap-aconitine, has been examined and described by several experimenters, so that its identification when in a pure crystalline condition is comparatively easy. Moreover, its precise physiological action has been studied by Dr. Fraser, of Edinburgh, who compared its action with that of fer-aconitine (the so-called pseudaconitine of Von Schroff) who reported thereon to the British Association at the Bradford meeting in 1873. His results, which are given in short abstract in the Annual Report, point to the necessity of discriminating between the two alkaloids when used for internal administration. But can they be with certainty discriminated? Undoubtedly, and it is the more necessary to take precautions in this direction, owing to the fact which Wright has pointed out that *Aconitum Napellus* yields both nap-aconitine and fer-aconitine, the later in very small proportion it is true but still enough to modify in a sensible degree the action of its companion alkaloid. That the more powerful *A. ferox* has frequently (probably as often as procurable) been employed for the extraction of commercial aconitine is unquestionable. The element of uncertainty thus introduced has perhaps had much to do with the neglect with which English practitioners have treated aconitine as an internal remedy; a neglect which is seen to be fully justified when it can be shown that of the commercial aconitines so-called many are wholly amorphous and therefore indefinite in character, whilst others are not only so, but are also contaminated with aconite alkaloids without toxic properties, and of little physiological activity of any kind.

Mr. Cleaver has pointed out the source of one such possible contaminant in *A. paniculatum*, which he states yields an inert alkaloid identical with that provisionally named pieraconitine, which I extracted in quantity from a batch of so-called *A. Napellus*. I at first supposed it to be identical with atisine, the alkaloid of *A. heterophyllum*, but I was assured by Dr. Broughton, who saw my specimens, that such was not the case, an opinion afterwards borne out by the results of combustions carried out in the laboratory of Dr. Wright.

I would recommend to anyone setting about the preparation of nap-aconitine for internal administration to be very careful in the selection of his roots. If possible, they should be grown in this country, with guarantee from the grower that they are the produce of *A. Napellus*.



Mr Holmes will soon, I hope, be able to tell us more about the numerous varieties of this plant and their relative degrees of toxicity.

To him we also hopefully look for showing us how to recognize them by optical means, microscopic or otherwise, as well as how to distinguish between the dried roots of *A. Napellus* and *A. paniculatum*.

Having obtained by following Stas' general method of extraction the crude alkaloids of presumably true roots, the aconitine before it can be safely used for internal exhibition must be separated in a crystalline condition. This is not difficult, but it is wasteful, if such a term can be permitted in this connection. Ordinary skill only is required, helped by extraordinary patience. As I pointed out so long ago as 1866, the nitrate is the best of its salts to crystallize, a fact I had demonstrated two years previously. I have never failed in producing it in quantity averaging, perhaps, one third of the total yield of alkaloid. From the nitrate the pure alkaloid or any of its salts can be made without difficulty.

It fortunately happens that the nitrate of fer-aconitine is crystallizable only from a strongly acid solution. It is therefore necessarily excluded from the crop of crystals obtained from a neutral or nearly neutral liquid.

There remains the possible admixture of picroaconitine, the nitrate of which crystallizes in forms so like those of nap-aconitine that by an ordinary observer they would not be distinguishable. Its bitterness is its most patent distinction. The poisonous aconitines are much less bitter. Moreover, its comparative solubility in dilute ammonia is characteristic; so that a nitrate of aconitine that yielded on precipitation with dilute ammonia a proportion of alkaloid much less than that due to its centesimal composition would deservedly be suspected. However, the best test of all would be the physiological applied to each batch of alkaloid by a competent experimenter, and a series of preparations so guaranteed produced by a house of known reputation, I am confident that in the course of a short time they would be accepted by the medical profession as a valuable addition to the list of heroic remedies.—*Phar. Jour. and Trans.*, November 17, 1883, p.<sup>s</sup> 397.

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**Sulpho-Carbolate of Sodium**, in thirty-grain doses given after meals, is recommended in flatulent dyspepsia; also in ten-grain doses for nausea and vomiting, particularly in pregnancy.—*Louisville Med. News*.

## NOTES ON CINCHONA ALKALOIDS.

BY C. H. WOOD AND E. L. BARRET.

In an abstract published in "*Amer. Jour. Phar.*," 1882, p. 75, the authors state that the crystals obtained from an ethereal extract of cuprea bark were composed of equal quantities of quinine and quinidine. They have since then investigated this subject more closely, and publish the results, etc., in the present paper. In the first case equal quantities of quinine and quinidine sulphates were dissolved separately in acidulated water, the solution shaken with ether, excess of soda added, and the whole agitated; as soon as the precipitates had dissolved in the ether, the ethereal solutions were decanted off and mixed. The crystals deposited from this mixed solution yielded, on analysis, numbers approximating to the composition 1 mol. quinine + 1 mol. quinidine +  $2\frac{1}{2}\text{H}_2\text{O}$ . In another experiment equal weights of the alkaloids were dissolved together in 50 per cent. spirit. The crystals obtained from this solution, after 48 hours' exposure over sulphuric acid, were similar in constitution to those described above. Whilst in a third experiment equal weights of the two sulphates were dissolved, etc., as in the first experiment, but the alkaloids were taken up with warm benzene. This time the crystals, even after three days' exposure, were found to contain 1 mol. quinine + 1 mol. quinidine +  $2\text{H}_2\text{O}$  +  $\text{C}_6\text{H}_6$ . From these facts the authors infer that the crystals always contain water, and therefore this compound is a hydrate of the two alkaloids.

When anhydrous, a mixture of quinine and quinidine has a lower melting point than either of the constituent alkaloids. Some of the anhydrous double body dissolved in dry benzene had deposited only a very few crystals, after remaining corked up ten days, but on removing the cork and exposing the contents of the flask to the air plenty of crystals soon formed, and in two days the solution was half filled with them. Quinine, prepared from the sulphate, when dissolved in warm benzene, forms rhomboidal crystals of the composition 2 mols. quinine +  $2\text{H}_2\text{O}$  +  $\text{C}_6\text{H}_6$ . They lose the benzene slowly; a sample after being kept for some time had lost all odor of benzene, but gave evidence of the presence of the hydrocarbon when treated with an acid. The authors remark on the analogy these crystals bear to those of the quinine and quinidine compound when crystallized from the same

menstruum. When anhydrous quinine is dissolved in dry benzene, it crystallizes out in needles containing a large quantity of benzene, which is gradually given off until only 1 mol. benzene is retained. Cinchonidine crystallizes from benzene without water, but with 1 mol. benzene, with which it readily parts. The benzene employed in these experiments was carefully purified. The authors recommended the following test for the purity of quinine: 0.7 gram of the quinine sulphate to be tested is dissolved in 20 drops of hydrochloric acid and 7 cc. of water; 7 cc. of benzene are added, and the whole warmed, and then shaken up with  $3\frac{1}{2}$  cc. of dilute ammonia. The benzene layer is separated, the quinine hydrate allowed to crystallize out and filtered off; the separation of feathery crystals then indicates the presence of cinchonidine. These crystals contain a large quantity of quinine. Less than 1 per cent. of cinchonidine can be recognized in this way. The crystals must be sought for within the liquid, not on the surface. The quantities and method of procedure given above must be strictly followed in order to ensure success. Absolutely pure benzene is not necessary for this test: the benzene should, however, crystallize when placed in a freezing mixture.—*Jour. Chem. Soc.*, Nov., 1883, from *Chem. News* [48], 4.

## THEOBROMINE.

BY E. SCHMIDT AND H. PRESSLER.

To prepare theobromine, the authors mix cacao which has been freed from oil by pressure, with half its weight of calcium hydroxide, and boil repeatedly with 80 per cent. alcohol. After recrystallizing the residue obtained from the evaporation of the alcohol, the theobromine forms a white crystalline powder. It is anhydrous, and sublimates at about  $290^{\circ}$  without melting. Its salts are obtained by dissolving the base in concentrated acids, and resemble those of caffeine in their instability, being decomposed by contact with water or alcohol. The *hydrobromide*,  $C_7H_8N_4O_2 \cdot HBr + H_2O$ , forms colorless transparent platy crystals, which lose their water at  $100^{\circ}$  together with a part of the hydrobromic acid. The *hydrochloride*,  $C_7H_8N_4O_2 \cdot HCl + H_2O$ , crystallizes in colorless rosette-like groups of needles which lose both water and hydrochloric acid at  $100^{\circ}$ . The *platinochloride*  $(C_7H_8N_4O_2)_2 \cdot H_2PtCl_6 + 4H_2O$ , has been described by Glasson. According to the

authors, it sometimes contains  $4\text{H}_2\text{O}$  and sometimes  $5\text{H}_2\text{O}$ . The *aurochloride*  $\text{C}_7\text{H}_8\text{N}_4\text{O}_2, \text{HAuCl}_4$ , forms yellow tufts of needles. The *sulphate* has been obtained in small colorless crystals, but of varying composition. The *nitrate*,  $\text{C}_7\text{H}_8\text{N}_4\text{O}_2, \text{HNO}_3$ , has been described by Glasson. The *acetate*,  $\text{C}_7\text{H}_8\text{N}_4\text{O}_2, \text{C}_2\text{H}_4\text{O}_2$ , forms a white voluminous precipitate, which gradually loses its acid by exposure to the air. In its behavior to methyl iodide, theobromine differs markedly from caffeine, for on heating the mixture either alone or in solution in alcohol or in chloroform, no combination of the theobromine with the methyl iodide takes place, whilst if a mixture of theobromine, alcoholic solution of potash, and methyl iodide in equivalent quantities is heated at  $100^\circ$  in sealed tubes, caffeine is produced, identical with the natural bases:  $\text{C}_7\text{H}_8\text{N}_4\text{O}_2 + \text{KOH} + \text{MeI} = \text{C}_7\text{H}_7\text{MeN}_4\text{O}_2 + \text{KI} + \text{H}_2\text{O}$ . On heating theobromine with hydrochloric acid at  $240\text{--}250^\circ$ , it suffers decomposition similar to that of caffeine, yielding ammonia, methylamine, sarcosine, carbonic anhydride and formic acid. The same products are also formed on boiling theobromine with solution of barium hydroxide, and attempts to obtain an intermediate product, *theobromidine* (corresponding with caffeineidine) have as yet been unsuccessful. The bromine-derivative,  $\text{C}_7\text{H}_7\text{BrN}_4\text{O}_2$ , obtained by the direct action of bromine, agrees with the compound described by Fischer. When theobromine is boiled with five parts of concentrated nitric acid in an upright retort until the greater part of the liquid has been volatilized, and the residue then evaporated on a water-bath, amalic acid is obtained. On boiling the latter with concentrated nitric acid a further decomposition takes place, with evolution of carbonic anhydride and formation of methylparabanic acid and methylamine. Maly and Hinteregger (1881,) have shown that, besides these products, ammonia is also produced when the oxidation is effected by means of chromic mixture. Caffeine is decomposed by nitric acid in the same way as theobromine, dimethylparabanic acid, methylamine, and carbonic anhydride being formed, and in this case also no ammonia.—*Jour. Chem. Soc.*, Sept. 1883; *Annalen* 217, p. 287.

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**Napelline**, an amorphous alkaloid obtained from aconite root, has been successfully used by Laborde to relieve neuralgia pains, and as a substitute for morphine in a case of the morphine habit. It was given hypodermically in doses of from one to four centigrams in the twenty-four hours.—*Journ. de Therapeut; Louisville Med. News.*



## ACTION OF HYDROCHLORIC ACID ON CAFFEINE.

BY E. SCHMIDT.

It was thought possible that theobromine might be formed by this reaction with elimination of a methyl-group. No reaction, however, takes place below about  $240^{\circ}$ , the caffeine then decomposing, with formation of carbonic anhydride, ammonium chloride, methylamine hydrochloride, sarcosine hydrochloride, and traces of formic acid,  $C_8H_{10}N_4O_2 + 6H_2O = 2CO_2 + 2MeNH_2 + NH_3 + CH_2O_2 + C_3H_7NO_2$ . The reaction is effected in sealed tubes, the temperature being maintained at  $240-250^{\circ}$  for 6—12 hours; above  $260^{\circ}$  the product becomes partially carbonized. The caffeine employed was the pure product obtained from tea. The methylamine hydrochloride is separated and purified by means of its platinochloride, which crystallizes partly in lustrous yellow plates and partly in orange-red rosette-like groups. The sarcosine was identified by means of its copper salt  $(C_3H_6NO_2)_2Cu, 2H_2O$ , sarcosine obtained by the action of barium hydroxide on caffeine yielding a perfectly similar salt. These results show that caffeine yields the same products by the action either of hydrochloric acid or of barium hydroxide, except that in the former case the intermediate product, caffeineine, is not produced. Theobromine is decomposed by hydrochloric acid, with formation of the same products as in the case of caffeine, but the proportion of ammonia to methylamine is in this case two molecules of the former to one of the latter, showing that the additional methyl-group in the caffeine must be united with a nitrogen atom. The fact that only one of the four nitrogen atoms in caffeine can be eliminated as ammonia is in accordance with the formula given by Fischer (*Annalen*, 215, 314), and Medicus (*ibid.*, 175, 250), but is not explained by Strecker's formula (*ibid.*, 118, 171).

The author has also very carefully compared artificial caffeine as prepared by Strecker (*loc. cit.*) with natural caffeine obtained from tea. His results confirm those previously obtained by Strecker, a comparison of the following salts proving that artificial and natural caffeine are identical. The *hydrochloride*,  $C_8H_{10}N_4O_2, HCl, 2H_2O$ , forms colorless monoclinic crystals, which give off hydrochloric acid and water by exposure to air, leaving pure caffeine, the same change taking place rapidly at  $100^{\circ}$ , or by the action of water or alcohol. The *platinochloride*,  $(C_8H_{10}N_4O_2)_2, H_2PtCl_6$ , crystallizes in small rosette-like groups

of needles, and contains variable amounts of water. *Caffëine aurochloride*,  $C_8H_{10}N_4O_2, HAuCl_4, 2H_2O$ , forms lustrous gold-colored plates. *Caffëine methiodide*,  $C_8H_{10}N_4O_2, MeI, H_2O$ , is formed when caffëine is heated for some hours at  $130^\circ$  with an excess of methyl iodide in sealed tubes, and may be purified by washing with cold alcohol and crystallizing from water, in which it is moderately soluble, although but sparingly so in alcohol, and almost insoluble in ether.—*Jour. Chem. Soc.*, Sept. 1883; *Annalen* 217, p. 270.

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## THERMOMETRIC MEASUREMENTS.

By J. M. CRAFTS.

The author remarks at the outset that the progress made in the purification and preparation of chemical substances has not been accompanied by any appreciable improvement in thermometric measurements. In these communications the author gives an account of a series of experiments on the commonly employed methods of fusion and ebullition, with a view of facilitating the construction of thermometers, of examining their behavior, and of rendering the method of observation precise.

In the thermometers from the best sources the author observed residual errors of  $0.015$ — $0.04$  degree, and when the scale is divided into tenths of a degree, in ordinary thermometers differences of length of  $0.1$ — $0.5$  degree in contiguous sections of  $25$  degrees. As these variations rarely compensate one another, it is not rare to find thermometers which require corrections amounting to several fractions of a degree.

In determining the value of a degree from the points  $0^\circ$  and  $100^\circ$ , it is most important to follow an invariable order in the observation of these points. After the point  $100^\circ$  has been fixed, the zero point must be determined by quickly cooling and placing the thermometer in pounded ice, or preferably snow, which has remained for some time in contact with distilled water. But even after adopting all the necessary precautions, the value of a degree may vary owing to the displacement of the zero point, which causes a change in various proportions of all the constants. In the original paper examples are given to show that the elevation of zero of  $1.24$  to  $2.6^\circ$  may cause an increase in the interval  $0$ — $100^\circ$  of  $0.04$  to  $0.9$  degree. On the other hand, a

depression of the zero point may be effected by heating a thermometer at various temperatures for a prolonged time, and then leaving it to cool in the air, and these depressions will necessarily increase all the constants of the thermometer when referred to the zero point. After such a depression has been effected, the thermometer, slowly at ordinary temperatures, but more quickly when warmed slightly, tends to revert to its original readings.

A considerable elevation of the zero point,  $10^{\circ}$  to  $26^{\circ}$ , is produced by heating the thermometer for a week at  $355^{\circ}$ , which is caused by the expansion of the glass bulb after it has been blown out and then suddenly cooled.

The elevation of zero in a thermometer maintained at ordinary temperatures diminishes gradually and ceases to be appreciable after five or ten years. Similarly variations produced by protracted heating tend towards constant limit; thus, for example, a thermometer may be heated for several days at  $300^{\circ}$ , or for several months at  $100^{\circ}$  without causing a variation in the effect produced by heating to  $355^{\circ}$ .

From the facts detailed above, it is necessary to heat a thermometer required for ordinary experiments for a week in boiling mercury, the whole of the stem being enclosed in the vessel; after this treatment, the points  $0^{\circ}$  and  $100^{\circ}$  will have a permanent value.

The author further remarks that thermometers with a limited range, from  $200^{\circ}$  to  $300^{\circ}$  for example, cannot be graduated with the same degree of precision, for the determination of the fixed points 0 and 100 becomes impossible, owing to the falling of the mercury within the reservoir. In order to fix definite points above  $100^{\circ}$ , the author suggests the use of naphthalene and benzophenone, substances which can be obtained in a state of purity; the former boils at  $218^{\circ}$ , and the latter at  $306^{\circ}$  under normal pressure; in a table in the original memoir, the boiling points of these two substances under various pressures are given.

In a thermometer which has been thoroughly deprived of air, the phenomenon of volatilization of mercury can be observed at  $100^{\circ}$ ; the column of mercury gradually descends, and after about 15 minutes the variation is about 0.01—0.02 degree. If the zero point is re-determined after each warming, no error is caused by the descent of the mercury. In all cases the mercury with which the thermometer is filled must not only be purified but boiled for a long time to rid the

instrument of bubbles of air which cling persistently to the sides of the bulb and stem.

The changes of barometric pressure may in ordinary cases be neglected, but it is necessary to take account of the differences of pressure dependent upon the horizontal or vertical position of the column of mercury in the stem of a long thermometer. But this factor cannot safely be neglected for second determination under reduced pressures, when the thermometer is immersed in the vapour: in these cases it is preferable to introduce a thermometer in a tube sealed at its lower extremity, and communicating directly with the atmosphere.

In conclusion, the author points out the errors in determination of boiling and melting points. In the former, errors frequently arise from a too hasty observation; to ensure accuracy the whole stem must be immersed in the vapour, and distillation must be carried on for at least ten minutes before the whole of the stem acquires the temperature of its environment.

To determine fusing points it is preferable to plunge the thermometer into the melting substances and to observe the changes of temperature during complete solidification: when the quantity of substance does not admit of this method of procedure, the usual process must be adopted.

In the memoirs, tables of corrections are given for converting readings of ordinary thermometers and those with limited scale, into readings of the hydrogen thermometer.—*Jour. Chem. Soc.*, Sept., 1883; *Bull. Soc. Chim.* [2] 39, p. 196.

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## EASILY OXIDISABLE CONSTITUENTS OF PLANTS.

BY J. REINKE.

It is a well-known fact that the juices of many plants become discolored on exposure to the air. So, too, sections of stems and roots of leaves and fleshy fruits which acquire a brown color on exposure. Little has been ascertained in regard to the physiology of these changes. They obviously depend upon the oxidation of certain constituents; this is seen, for instance, on exposing grated potatoes to the air, when the uppermost layer assumes a brown color, which by frequent turning over of the mass may be communicated throughout. The same is seen in the case of the expressed juice of the potato. Putrefaction or fermentation, and reducing agents, such as sulphurous or hydrosulphuric acid, decolorise these fluids. The juice of the white sugar-beet is even more sensitive, becoming on exposure to the



air immediately of a dirty wine-red color, then violet, brown and finally almost black. These facts indicate the presence in plants of easily oxidisable bodies, and inasmuch as the products of their oxidation do not occur within the uninjured cells, it follows that there is either no free oxygen in the latter, or that with these oxidisable substances other reducing substances are concomitant, hindering their oxidation, or again, that in the protoplasm oxidation affords other uncolored products. Upon which of these three factors the colorless state of the protoplasm and cell-juice of living plants depends is not yet decided.

In the study of oxidation processes in the living plant-cell, an important question presents itself, as to whether substances occur in the cell which at ordinary temperatures unite with atmospheric oxygen without the essential co-operation in this process of the living protoplasm. Difficult as the problem is, the isolation and determination of constitution of these easily oxidisable substances forms an indispensable preliminary step. It may be conjectured that they belong to the aromatic series. In this connection the numerous hydroxybenzene derivatives claim attention, of which many are known to be easily oxidisable. Pyrogallol in alkaline solutions greedily absorbs oxygen and becomes decomposed into carbonic anhydride, acetic acid, and a brown body of unknown nature. The dihydroxybenzenes (catechol, resorcinol, and quinol) are easily oxidisable bodies, and their methyl derivative orcinol is colored red by the air. As regards derivatives of the anthraquinone series, there is the change of indigo-white into indigo-blue, and the behavior of *Boletus luridus*, the colorless section of which becomes at once blue on exposure to the air. Lastly, there is a series of complex plant-constituents, undoubtedly benzene derivatives although their constitution has not yet been ascertained, which exhibit many analogies to the discoloration of plant juices. Of these brazilin may be named, the colorless aqueous solution of which becomes first yellow, then reddish-yellow in the air.

The author, in his endeavors to isolate the easily oxidisable constituents of the sugar-beet and potato to which the discoloration of their respective fluids is attributable, succeeded in the first instance in isolating from the beet-root a chromogen which on exposure to the air acquired a red color. This substance he has accordingly designated *Rhodogen*. The product of its oxidation he terms *beet-red*, and he notes certain remarkable analogies between the absorption-bands of this substance and of the coloring matter of *Achusa tinctoria*, alkanet red, the spectrum of each showing three bands occupying identical positions. These investigations have therefore so far afforded proof of the existence in the colorless cells of the sugar-beet of an easily oxidisable colorless body, capable of isolation, which by itself, without the aid of the living plasma of the plant, can split up the oxygen molecule, forming a colored substance.

The isolation of the chromogen of the potato has not succeeded so satisfactorily. The presence of vanillin in the juice appeared to be shown by the strong odor of vanilla. Vanillin has been detected by Scheibler in raw beet-sugar. A substance resembling catechol, but not identical with it, was also separated. It would seem to be the same body discovered by Gorup-

Besanez in the leaves of *Ampelopsis hederacea*. It is undoubtedly an acid, and amongst the known aromatic acids most closely corresponds in its reactions with hydrocaffeic acid. In conclusion, the author suggests the hypothesis that these easily oxidisable bodies belong, in their physiological relations, to the retrogressive series, perhaps originating from the breaking up of albumin, or formed by the synthesis of the products of such decomposition, and that in these features they are allied to the process of respiration.—*Jour. Chem. Soc.*, Sept., 1883; *Zeitschr. Physiol. Chem.*, vi, 263.

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## VARIETIES.

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USE OF NAPHTHALIN.—Dr. Lindenbaum has employed this remedy with success in a number of cases of frost-bite. The dressing is usually changed every seven to ten days. In some instances the patients complained for two or three hours after the application of severe sticking pains, caused probably by small crystals of naphthalin. The same remedy seems to be equally beneficial in burns.—*St. Petersburger Med. Wochenschrift*, June 2, 1883; *Med. Record*.

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TRICHLOR-PHENOL has been experimented upon by Dr. Dianin, and described by him in the "St. Petersburger Medicinische Wochenschrift. It is prepared from carbolic acid and chloride of lime. ("British Medical Journal.") Its antiseptic properties are said to be more active than those of any other substance used in medicine (twenty-five times more so than carbolic acid), and a small quantity stops fermentation. It is also a deodorizer, while its own smell may be disguised by oil of lavender. Dissolved in water, it does not cause irritation. Its sodium and calcium salts also exhibit antiseptic properties; the former has no smell, and the latter is cheaper than phenol.—*Louisv. Med. News*, Sept. 15, 1883.

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ARBUTIN.—Dr. H. Menche, in "Centralblatt für. Klin. Med.," finds that it acts in many cases as a valuable diuretic. Large doses may be taken without any ill effects. It passes in the urine partly in the form of hydrochinon, which is closely allied chemically to phenol. Urine containing hydrochinon becomes, by standing, of an olive-green color, just as happens in carboluria. Arbutin is of service in urethritis even of a specific nature. Brieger has employed a solution of hydrochinon as an injection in gonorrhœa, but the internal administration would seem to answer the same purpose. Arbutin is a glucoside, and occurs as fine white stable acicular crystals, soluble in water, of neutral reaction, odorless, and of slightly bitter taste. The best mode of administration is in the form of powder dissolved in a tablespoonful of water. Patients do not complain of its taste.—*Louisv. Med. News*.

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THE ACTION OF QUEBRACHO.—A number of experiments, chiefly by Italian and Spanish physicians, which we find recorded in our foreign exchanges, satisfactorily show that quebracho and its alkaloids aspidosper-

mine and quebrachine act with positive effect in reducing the action of the heart and relieving many cases of dyspnoea. Mariani considers it the only agent known which exerts a specifically anti-dyspnoeic action by itself. He finds its exhibition very beneficial both in asthmatic and nervous dyspnoea and that which accompanies inflammatory pulmonic affections. Its action on the heart is decided enough to reduce its pulsations twenty in the minute.—*Med. and Surg. Reporter*, Dec. 8, 1883.

## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, December 18, 1883.

In the absence of the president, D. Parrish, Dr. A. W. Miller was called to the chair.

The minutes of the last meeting were read, and there being no corrections, were declared approved.

The chairman asked attention to a very beautiful set of chemical specimens presented by the Mallinckrodt Chemical Works, of St. Louis, Mo. This presentation was made at the suggestion of Dr. Miller to one of the firm, who was visiting the Eastern part of our country with a view of introducing their goods to the notice of the trade of this section.

The specimens were received, and ordered to be placed in the Cabinet, and the secretary directed to acknowledge their receipt, and to return the thanks of the College for the same.

The manufacturers express the hope that they may be made use of in illustrating the lectures before our classes. Two other sets of specimens were sent with these, one of which was donated to the University of Pennsylvania, the other to the Women's Medical College.

The report of the Commissioners of Public Education was acknowledged, and the librarian was instructed to preserve it in the Library.

A paper pure Chloride of Barium was read by Mr. A. E. Brown, a member of the present class. He states that there was found about 2.1 per cent. of alumina present.

Mr. Trimble said this did not prevent its use in precipitating sulphuric acid, but when barium determinations were to be made it was then a source of trouble. The paper was referred to the Publication Committee.

A paper upon Glycerite of Tar was read by the secretary, and also a short one upon Choleate or Cholenate of Sodium. The paper was referred to the Publication Committee.

Professor Trimble exhibited a specimen of Paraldehyd, which has been lately introduced for the same purpose as chloral hydrate. It is said to be less objectionable than Chloral as its use was not so likely to grow into a habit as was the case with other hypnotics. This statement, he said, must be taken with great allowance, as almost all the newly introduced preparations were generally much lauded, and subsequent use only gave them their true place.

Prof. Trimble stated that the Paraldehyd was made by treating aldehyd with strong sulphuric acid, refrigerating it, which caused it to crystallize; the crystals are to be separated, and as the temperature is raised the crys-

tals dissolve; the difficulty about preparing it is to obtain a pure aldehyd, while a considerable amount of it was offered as pure there was but little that was really so.

Dr. Miller stated that he had lately had occasion to test the solubility of Olibanum, and was surprised to find upon treating it with oil of turpentine that nearly fifty per cent. of insoluble matter was present, a good portion of which seemed to be of a calcareous nature.

There being no further business, the meeting adjourned.

T. S. WIEGAND, *Registrar.*

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

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*Botanical Microchemistry.* An introduction to the study of vegetable histology. Prepared for the use of students, by V. A. Poulsen. Translated with the assistance of the author and considerably enlarged by Wm. Trelease, Professor in the University of Wisconsin. Boston: S. E. Cassino & Co., 1884, pp. 118.

Mr. Poulson's little work made its first appearance in Denmark in 1880, and in the following year a German translation of it was published. When we first began to consult it we found it of such great value, that we regretted that it was not available to a large number of the students in microscopy in this country. This want has now been supplied by Prof. Trelease, and we take great pleasure in recommending it to all microscopists. The treatise describes the different reagents used under the microscope and their application, also the most important mounting media and cements. The second part treats of the different vegetable substances, organized and unorganized, and the methods of recognizing them.

As compared with the German edition, the work has been considerably amplified by the author, and a number of valuable additions have been made by the editor and translator, who has performed his task very creditably. We would, however, suggest more consistency in the chemical nomenclature; there is no obvious reason why alongside of potassic hydrate, ferrocyanide and nitrate, we should have chlorate of potassium; or why for the chloride and acetate of iron, the ferric compounds should not be distinctly indicated by the name, the more so since in the text it is not stated whether the ferrous or ferric compounds are intended. The German designation "Chlorzinkjod" is descriptive for a solution of iodine in zinc chloride; but the same cannot be said of "chlor-iodide of zinc."

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*A Manual of Chemistry, physical and inorganic.* By Henry Watts, B.A., F.R.S., editor of the Journal of the Chemical Society; author of "a Dictionary of Chemistry." Philadelphia: P. Blackiston, Son & Co., 1884.

The author states in the preface that the work is founded on the well-known "Manual of Chemistry" of the late Professor Fownes, a work which has been long and favorably known also in the United States, where it has been used as one of the most favorite text-books for students in chemistry.

Although the name of Fownes does not appear upon the title page, the present is merely a new edition of the original work, retaining all the excellencies of the latter and revised so as to represent the general principles



and most important facts accepted in the present state of chemical knowledge. Aside from what has been modified, rewritten or added, a rearrangement of the material has been deemed advisable, so that the book differs in some respects from its predecessors. These having been reviewed in former volumes of the "Journal," it is not deemed necessary to enter into its special features, which as stated before remain unaltered; nor can we attempt to point out the new matter added, which is in keeping with the original design of the work so well preserved by Mr. Watts in previous editions. We must content ourselves with stating the main features of the rearrangement of the subject-matter, which is nearly identical with that of Roscoe and Schorlenner.

To the introductory part have been added brief sketches of the most important elementary bodies for the purpose of introducing here also the general laws of chemical combination, comprising nomenclature and notation, the laws of multiples and of equivalents, and equations.

The non-metallic elements are now considered in the following order: Beginning with hydrogen and with the four halogens, oxygen is next treated of, with the general conditions of combustion and the oxygen compounds of the preceding elements. Then follow sulphur, selenium, tellurium, nitrogen, phosphorus, arsenic, boron, silicon and carbon. The general laws of chemical combination are now considered more in detail, as they formerly were at the end of the non-metallic elements.

After a general characteristic of the metals and their compounds, these elements are then grouped together in the following manner: Alkali group consisting of potassium, sodium, lithium, cesium, rubidium, and ammonium; group of the alkaline earths, calcium, strontium and barium; magnesium group, containing also beryllium, zinc and cadmium; lead group with thallium; copper group with silver and mercury; yttrium group with cerium and eight other rare metals; aluminium group with indium and gallium; iron group with manganese, cobalt and nickel; chromium group with molybdenum, tungsten and uranium; tin group with titanium, zirconium and thorium; antimony group with vanadium, bismuth, tantalum and niobium; and platinum group comprising gold and the metals known as platinum-metals.

The appendix contains the tables of former editions. The text is illustrated with 150 well executed wood-cuts and spectral analysis is explained by means of a colored plate.

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*A Treatise on Pharmacy*, designed as a Text-book for the Student and as a Guide for the Physician and Pharmacist, containing the Official and many Unofficial Formulas and numerous Examples of Extemporaneous Prescriptions. By Edward Parrish, late Professor in the Philadelphia College of Pharmacy, etc. Fifth edition, enlarged and thoroughly revised. By Thos. S. Wiegand, Graduate of the Philadelphia College of Pharmacy. With 256 illustrations. Philadelphia: Henry C. Lea's Son & Co., 1884. 8vo, pp. 1090

This well-known work presents itself now based upon the recently revised new Pharmacopœia. Though the general character of the former editions has been preserved, several important modifications of the internal arrangement have been made, and we believe they will mostly be found to increase the practical usefulness of the book.

Perhaps the most important change is in the present Part III, on "Pharmaceutical Processes and Apparatus," the subject of which formed a portion of Part V, on "Galenical Pharmacy," and Part III, on "Inorganic Pharmaceutical Chemistry," in former editions. The remaining parts, though necessarily changed in number, remain otherwise as before. The classification of the metals in former editions was based upon their chemical and in a measure upon the medicinal analogy of their compounds; in the present edition they are classed according to their quantivalence. We confess that we prefer the former or some similar plan, though the latter may be apparently more scientific. Chapter V, however, contains several metals which are not tetrads. The subdivision of the part relating to "Organic Chemistry" remains essentially unchanged. Originally suggested by the elder Soubeiran, and necessarily materially modified in the course of time, the classification has peculiar advantages for the pharmaceutical student, and several of the groups are even at the present time considered in a similar manner in systematic works on organic chemistry. But the advances in this branch of science have been very great of late years, and would seem to necessitate greater changes in the introductory portion of several chapters and in some of the syllabi. The volatile oils, neutral principles and alkaloids at present known to exist in plants, and more or less investigated, are so numerous that it seems advisable in a work of this kind to confine their enumeration to medicinal and otherwise important plants.

The part on "Galenical Pharmacy"—notwithstanding several chapters have been transferred to another part, as stated above—has been increased from 240 to over 300 pages. Each page bears evidence of the care bestowed upon it, and conveys valuable information from the rich store of the editor's experience. In fact all that relates to practical pharmacy—apparatus, processes and dispensing—has been conveniently arranged, and described with clearness in its various aspects, so as to afford aid and advice alike to the student and to the practical pharmacist. It is scarcely necessary to mention that the work is judiciously illustrated, with good wood cuts, and is well printed upon good paper.

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*A Digest of Materia Medica and Pharmacy*; forming a complete Pharmacopœia for the use of physicians, druggists, and students. By Albert Merrell, M.D., Professor of Chemistry, Pharmacy, and Toxicology in the American Medical College, St. Louis, Mo., etc. Philadelphia: P. Blakiston, Son & Co., 1883. 8vo, pp. 512.

The work has evidently been written for the use of physicians of the eclectic school. For the professional pharmacist, it contains little that would be of direct use to him, and nothing which he could not find in other works of reference usually on hand, except the strength of eclectic galenical preparations, which, from the position of the author, we presume to be authoritative. The vegetable and animal drugs are merely enumerated, without an attempt of describing them. The constituents of each, when known, are mentioned, and generally very briefly characterized as to their solubilities; but even in this respect the information dates usually back three or four years, and the investigations made in the meantime are not considered, including such important ones as those on the alkaloids of the solanaceæ, the constituents of colchicum, etc. Chemical compounds

are, as a rule, characterized, but entirely insufficient for their recognition. The tests of purity are usually given correctly, although very briefly and without making allowance for admissible impurities. Chrysarobin is still called chrysophanic acid.

About forty pages of the work are devoted to "Pharmacy," which may serve as a guide to physicians supplying their own medicines, but is evidently insufficient to be considered even as a mere sketch of the vocation of a pharmacist. The evident aim at briefness has made the author, in some cases, say what we do not believe he intended to assert. The statement that "alcohol does not dissolve any of the most common non-medicinal principles except chlorophyll," should certainly not be taken to mean that "everything, except chlorophyll, dissolved by alcohol possesses medicinal virtues." The statement is not correct that "water dissolves only part of the medicinal principles enumerated and *all* the non-medicinal." Nor is it correct to say that "the liquid removed (in the preparation of tinctures by maceration) represents the drug in exactly the proportion its weight bears to the menstruum used in maceration," for the principles dissolved by the menstruum necessarily increase the weight of the liquid. It is, however, proper to say that this introductory portion contains many good suggestions, which show that the author is by no means a novice in pharmaceutical manipulations. To the effects and therapeutical uses of the drugs, as described in the work, our remarks do not apply.

The book is well gotten up and will be welcomed by those who may be desirous of acquainting themselves with pharmacy of the eclectic school.

*Proceedings of the Fourth Annual Meeting of the Illinois Pharmaceutical Association*, held at Springfield, October 9 and 10, 1883. Chicago. 8vo, pp. 103.

An account of the meeting will be found on page 633 of our last number.

*The Nelson Price Book Revised.* The Druggists' Pocket Price Book, for retailers, jobbers, manufacturers, and traveling salesmen; showing the exact location of every article in the store, cost and selling price, quotations, discounts, etc. Third edition. Entirely rewritten, rearranged, and improved by Benj. Lillard. New York: J. H. Vail & Co. Price, flexible leather, \$3.00.

The contents are arranged in alphabetical order with one marginal index, in which respect, as well as in its greater completeness, it differs from the former edition.

*Classification of the Materia Medica Collection of the United States National Museum and Catalogue of Specimens.* By James M. Flint, Surgeon U. S. Navy, Curator of the Department of Materia Medica. 8vo, pp. 45.

The articles are classified according to their origin as, 1, animal products; 2, vegetable products; 3, products of fermentation and distillation; 4, inorganic products. The first division is arranged in classes and orders recognized in zoology; the second division according to the botanical system of Bentham and Hooker, and the fourth division under the elements grouped according to Roscoe and Schorlemmer. The catalogue shows that the collection is already a very full one, embracing many specimens, not found in regular commerce.



*Index to the Transactions of the American Medical Association, Vols. I-XXXIII.* Prepared by Wm. B. Atkinson, M. D., Permanent Secretary. Philadelphia, 1883. 8vo, pp. 130.

A useful and well-prepared general index of these Transactions, which renders the subject-matter contained therein available. Since last year the Association has discontinued the publication of an annual volume, and replaced it by a weekly Journal published under the auspices of the Association, such a general index became very desirable.

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## OBITUARY.

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JOHN ELIOT HOWARD, F.R.S., the celebrated quinologist, died quite unexpectedly on the 22d of November last, at his residence, Lord's Meade, Tottenham, having attained the ripe age of 76 years. He was born December 11, 1807, and, after leaving school, entered the business established by his father, Luke Howard, at Stratford, and carried on under the well-known firm of Howards & Sons. It is not unlikely that the publication of Weddell's important work on the cinchonas, published in 1849, may have more forcibly directed Mr. Howard's attention to this important subject; at any rate, in 1852, he published his first paper on cinchona, an elaborate examination of Pavon's specimens of bark preserved in the British Museum, and from this time until his death he was foremost in the endeavors made to secure to suffering humanity a bountiful supply of this indispensable remedy. He traced the valuable manuscript of Pavon, entitled "*Nueva Quinologia*," which had remained unnoticed for about 35 years in Spain, and published it in 1862, embellished with 30 beautiful colored plates, drawn by the well-known artist Mr. Fitch, from Pavon's original specimens preserved at Madrid. In the meantime, the Dutch government had sent Hasskarl, and the British government Clements Markham, with several aids, on their mission to the cinchona region, which resulted in the transplantation of the valuable trees to Java and India and afterwards to other countries. For nearly 30 years, and up to the time of his death, Mr. Howard gave all the aid in his power to this important enterprise, and his services were, in 1873, acknowledged in a special vote of thanks from the British government. Of the numerous papers written by him on the subject, to which he devoted so much time and labor, quite a number have been transferred to the pages of this Journal. His illustrated *Quinology of the East India Plantations*, published in three parts, contains the results of important researches in this field; it forms a most valuable part of the extensive literature on the cinchonas.

For thirty years, Mr. Howard was a member of the Pharmaceutical Society of Great Britain; on the 6th of October last he received the Hanbury gold medal as a recognition of the value of his scientific investigations respecting an important article of *materia medica*. He was also a member of the Linnean Society, the Royal Society, the British Pharmaceutical Conference, and an honorary member of numerous scientific bodies, among them of the Philadelphia College of Pharmacy.

Mr. Howard died after a very brief illness, leaving a large circle of children and grandchildren.



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Pfaffel, Robt. Wm.,	Philada.,	Pa.	L. Wolff, M. D.
Poechner, Adolph,	Bomberg,	Germany.	J. Wyeth & Bro.
Post, Philip Von Riper,	Philada.,	Pa.	W. B. Webb.
Pritchett, Hartwell Harrison,	Danville,	Va.	H. A. Wiseman.
Purdy, Frank Vansant,	Doylestown,	Pa.	Dr. G. T. Harvey.
Rayner, Howard Lincoln,	Norristown,	Pa.	R. Shoemaker & Co.
Read, Clinton Hubert,	Philada.,	Pa.	Stirling Kerr, Jr.
Reagan, Dennis,	Easton,	Pa.	H. B. Semple.
Rebner, Chas. Morria,	Atchison,	Kan.	McPike & Fox.
Rebsamen, Chas. Fred.,	Leavenworth,	Kan.	Geo. Ummethum.
Reynolds, Walter,	Philada.,	Pa.	C. L. Mitchell & Co.
Reinholdt, Henry Otto,	Sheboygan,	Wis.	M. R. Zaegel & Co.
Rhoads, Wm. Stevens,	Hontzdale,	Pa.	Dr. J. W. Rhoads.
Rhoads, Harry Franklin,	Pottstown,	Pa.	J. A. Selinger.
Rhodes, Chas. Henry,	Philada.,	Pa.	
Rhodes, Chas. O.,	Groton,	N. Y.	Dana Rhodes.
Rose, Wm. Oscar,	Philada.,	Pa.	W. R. Warner & Co.
Roe, Edw'd John,	Harrisburg,	Pa.	J. A. Thorley.
Roseberry, John Mackey,	Philipsburg,	Pa.	W. D. Robinson, M. D.
Roseuzweig, Benj.,	Philada.,	N. J.	J. B. Moore.
Rossler, George,	Philada.,	Pa.	E. Jungmann.
Rottner, Charles Selmar,	Philada.,	Pa.	P. Rottner.
Roberts, Jos. Cuttall,	Wilmington,	Del.	Smith & Painter.
Saunders, Henry Scholey,	London,	Ontario (Can.)	Wm. Saunders.
Schaible, Emil,	La Fayette,	Ind.	D. Hilt.
Schlegel, Carl Edward,	Davenport,	Iowa.	
Schock, Frederick Albert,	Philada.,	Pa.	E. R. Burdick.
Schofield, Allen Curtis,	Piqua,	Pa.	C. J. Biddle.
Schofield, Thos. La Blanc,	Philada.,	Pa.	Hance Bros. & White.
Schuchard, Herman,	San Antonio,	Texas.	G. H. Katteyer.
Schulmeyer, Louis Henry,	Indianapolis,	Ind.	L. C. Schulmeyer.
Scull, Andrew Stewart,	Milledale,	N. J.	Dr. M. Wert.
Scales, Charles B.,	Cleveland,	Ohio.	S. P. Churchill.
Seckel, Guy, Jr.,	Philada.,	Pa.	G. D. Wetherill & Co.
Seller, Wm. Frederick,	Philada.,	Pa.	B. W. Fetters.
Serfass, Abraham Lincoln,	Allentown,	Pa.	C. Lawall & Son.
Shertzer, Edward Augustus,	Lancaster,	Pa.	W. H. Hickman.
Sinne, Hans Heinrich,	Philada.,	Pa.	A. Nebeker, M. D.
Smith, Aloysius John,	Philada.,	Pa.	G. D. Wetherill & Co.
Smith, Garrett Stout,	Magnolia,	Md.	W. N. K. Boileau.
Snively, Harry,	Lancaster,	Pa.	S. R. McCleary.

Matriculants.	Town or County.	State.	Preceptor.
Smythe, George M.,	Bryn Mawr,	Pa.	Rowley & Tustin.
Stearns Moses,	Philada.,	Pa.	C. A. Rutherford.
Steinecken, Geo. Augustus,	Wilmington,	Del.	J. M. Griffin.
Steinmetz, Wm. F.,	Philada.,	Pa.	M. G. Briggs.
Stinebeck, William Adam,	Columbia,	S. C.	Dr. D. S. Pope.
Stermmer, John Henry,	York,	Pa.	W. O. Burns.
Stewart, Harry Clifton,	Wheeling,	W. Va.	G. P. Schaeckle.
Stichter, Henry D.,	East Greenville,	Pa.	E. B. G. rigues & Co.
Stoll, Samuel Frank,	Bucyrus,	Ohio,	C. A. Spencer.
Stover, William Wilard,	Leni,	Ill.	Dr. A. A. Brown.
Swain, Harry,	Georgetown,	Del.	S. D. Marshall, M. D.
Thiebaud, Hugh McCallum,	Vevay,	Ind.	A. W. Peek.
Thompson, Edward Waite,	Nashville,	Tenn.	
Thompson, George Washington,	Titusville,	Pa.	M. Goldsmith.
Tidd, Harry,	Chambersburg,	N. J.	M. Tidd.
Tift, Fred. Alden,	Camden,	N. J.	J. Griffith Howard.
Trusley, Grant Simpson,	Wrightsville,	Pa.	C. Wilson.
Traub, Chas. Cadrick,	Philada.,	Pa.	E. C. Jones & Co.
Trout, Winfield Scott,	Philada.,	Pa.	W. R. Warner & Co.
Van Buskirk Samuel Levick,	Bethlehem,	Pa.	Van Buskirk & Apple.
Vannort Wm. Augustus,	Kent,	Md.	L. M. Pratt, M. D.
Von Achen, Frank Herman,	Peoria,	Ill.	F. C. Bourscheidt & Bro.
Wagner, Geo. Lewis,	Allentown,	Pa.	D. S. Jones.
Wain, Chas. Herbert,	Yardville,	N. J.	L. E. Sayre.
Ward, Joseph Poletus,	Gaston,	Ala.	
Watson, Maurice,	Bristol,	Pa.	S. Douglass.
Wegener, Henry,	Baraboo,	Wis.	Geo. Phipps.
Weisel, Benjamin Franklin,	Elizabeth City,	N. C.	Wood & Wadsworth.
Whilden, Chas. Bennett,	Charleston,	S. C.	G. I. McKelway.
Whinna, Joseph,	Philada.,	Pa.	B. H. Dietl.
Whitney, Heston,	Glassboro,	N. J.	J. G. Wells.
Wilkinson, Wm. John,	Philada.,	Pa.	D. L. Witmer & Bro.
Williams Neri Barndt,	Easton,	Pa.	E. T. Meyers.
Windolph, Frederick, Jr.,	Dover,	Del.	T. C. Tomlinson.
Wingender, Wendell Philips,	Schuylkill Haven,	Pa.	G. D. Boiton.
Winslow, Colburn Thue,	Benezette,	Pa.	C. M. Boger.
Wirth, Adolph Leopold,	Milwaukee,	Wis.	L. Wirth.
Wolff, Louis,	Hessen,	Germany.	E. Lamparter.
Wood, Alfred Conard,	Hatboro,	Pa.	T. L. Buckman.
Woodill, Robert Wellesley,	Halifax,	N. S.	Avery, Brown & Co.
Wright, James Edward,	Philada.,	Pa.	R. R. Stewart, M. D.
Yost, Wm. Oscar,	Norri-town,	Pa.	W. Stahler.
Young, Chas. Thomas,	Round Rock,	Texas,	Dr. A. McDonald.
Young, Robert Taylor,	Philada.,	Pa.	W. H. Llewellyn.
Zieber, Paul,	Hanover,	Pa.	B. H. Herlich.

# SENIOR CLASS.

Matriculants.	Town or County.	State.	Preceptor.
Abou, Joseph William,	Clinton,	Miss.	P. Fitch, M. D.
Adams, Ellsworth Smith,	Beverly,	N. J.	A. W. Taylor, M. D.
Alexander, Fred. Wm.,	Rochester,	N. Y.	F. W. Pfaff.
Allen, Charles Spencer,	Easton,	Pa.	A. J. Odenwelder.
Anderson, Harry Warren,	Bath,	Me.	S. Anderson.
Andrews, Frederick Owen,	Avondale,	Pa.	Geo. Cooke.
Babb, Grace Lee,	Eastport,	Me.	J. P. Remington.
Ball, John Alexis,	Philada.,	Pa.	R. D. Jones, M. D.
Baker, Thomas David,	Lewisburg,	Pa.	Smith, Kline & Co.
Ballinger, Abraham Lincoln,	Medford,	N. J.	C. L. Mitchell & Co.
Barber, Harry Lee,	Philada.,	Pa.	C. E. Spenceley.
Beans, Edwin K., Jr.,	Philada.,	Pa.	M. Goldsmith.
Bender, Wm. Piper, Jr.,	Camden,	N. J.	J. R. Augney.
Betts, William Hart,	Pineville,	Pa.	H. C. Blair's Sons.
Bollinger, Charles Wesley,	Apollo,	Pa.	T. A. Cochran.
Bollman, Curtis Jacob,	Mansfield,	Ohio.	D. F. Shull & Co.
Booze, Edgar Ellsworth,	Trenton,	N. J.	Lalor & Mangold.
Boynton, William Carlton,	Auburn,	Me.	Young & Stone.
Bray, Walter S.,	Dexter,	Me.	D. G. Hurley.
Bridgeman, Frank Fred.,	Sheboygan,	Wis.	Geo. Holland.
Briggs, Matt Ashley, Jr.,	Valdosta,	Ga.	R. Thomas & Co.
Brown, Albert Edward,	Mobile,	Ala.	Benj. Ward.
Bullock, William Anthony,	Philada.,	Pa.	Bullock & Crenshaw.
Burt, Walter Colton,	Philada.,	Pa.	Bullock & Crenshaw.
Cadmus, Robert Clark,	Philada.,	Pa.	W. J. McLean.
Carter, Buchanan,	Toisnot,	N. C.	E. H. Kaerocross.



Matriculants.	Town or County.	State.	Preceptor.
Cassell, Wm. Ellsworth,	Harrisburg,	Pa.	F. S. Keet.
Champion, Carleton Cole,	Philada.,	Pa.	Bullock & Crenshaw
Chandler, Isaac Eugene,	Kennett Square,	Pa.	D. W. Hutchison.
Christ, Charles Wesley,	Selins Grove,	Pa.	E. J. Lehman.
Clark, Robert, Jr.,	Philada.,	Pa.	Dr. G. M. Ward.
Clayton, Abraham Theophilus,	Philada.,	Pa.	O. L. Coles.
Cliffe, William Lincoln,	Philada.,	Pa.	J. B. Reynolds.
Cohen, Nathan Alexander,	Philada.,	Pa.	Mussen & Housekeeper.
Colegrove, La Rue Robert,	Elmira,	N. Y.	W. K. Mattern, M. D.
Coleman, John Joseph,	Wheeling,	W. Va.	Chas. Moenkmueller.
Collins, Paul,	Newark,	Ohio.	J. W. Collins & Sons.
Cook, Harry C.,	Columbus,	Ohio.	John R. Cook.
Cook, Wm. Alexander,	Americus,	Ga.	
Cox, Geo. Washington,	Philada.,	Pa.	J. T. White.
Crawford, Joseph,	Philada.,	Pa.	R. F. Babp.
Crawford, Samuel Douglass,	Nazareth,	Pa.	J. M. Shoffner.
Cress, Charles Thos. Wm.,	South Bethlehem,	Pa.	S. P. P. Whiteside & Son.
Custer, John Whiteside,	Philada.,	Pa.	Bullock & Crenshaw.
Dallett, Prosper Martin,	Philada.,	Pa.	J. L. Curry.
Dalpe, Frederick Augustus,	Reading,	Pa.	J. H. Blake.
Darrach, Francis Leaming,	Philada.,	Pa.	J. M. Wert, M. D.
Davies, John Jenkins,	Scranton,	Pa.	W. C. Bakes.
De Huyl, Bernard H.,	Abilene,	Kan.	D. R. De Long, M. D.
De Long, William Edward,	Bangor,	Pa.	The F. Dohmen Co.
Dohmen, William Fred.,	Milwaukee,	Wis.	M. Eisner.
Dreiss, Hermann,	San Antonio,	Texas.	L. A. Braddock.
Dutton, William,	Haddonfield,	N. J.	C. Shivers.
Eberle, Eugene Gustav,	Watertown,	Wis.	H. C. Eddy.
Edwards, Chas. Matthew,	Millington,	Md.	W. F. Owen.
Eisenhart, Foster Benjamin,	Philada.,	Pa.	Marcy & McCray.
Eldridge, Joseph Johnson,	Cape May,	N. J.	S. P. Wright.
Evans, Edmund Hann,	Philada.,	Pa.	C. A. Heinitsh.
Falck, Milton Smoker,	Lancaster,	Pa.	F. Guibound, M. D.
Falk, John Charles,	St. Genevieve,	Mo.	W. H. Lacey.
Fearbeller, Theo.,	Philada.,	Pa.	A. Scherer.
Feldkamp, Charles Louis,	Chicago,	Ill.	B. W. Feters.
Fetters, Frank Penicks,	Philada.,	Pa.	B. W. Feters.
Fetters, Wm. Anderson,	Philada.,	Pa.	E. A. Stahler.
Fillman, Eugene Anderman,	Norristown,	Pa.	A. R. Finck, M. D.
Finck, Robert, Fechtig,	Philada.,	Pa.	A. L. Thorn.
Fitzgeorge, Thos.,	Trenton,	N. J.	H. H. Owen.
Fitzpatrick, Philip T.	Lancaster,	Pa.	Dr. J. Howard Owen.
Follmer, Daniel,	Milton,	Pa.	Brown & Dawson.
Fox, Frederick Henry,	Phoenix,	N. Y.	E. H. Kaerccross.
Funk, Francis Marion,	Wauseon,	Ohio.	H. K. Watson.
Gano, Wm. Hubble, Jr.,	Wilmington,	Del.	Dr. Colton.
Gardner, Charles,	Columbus Junction,	Iowa.	R. Shoemaker & Co.
Geiger Geo. Lambert,	Stanton,	Va.	
Georges, Amandus George,	North Java,	N. Y.	
Goldbach, John,	Toledo,	Ohio.	H. S. Barr.
Groff, Frank Barr,	Philada.,	Pa.	L. C. Funk.
Hall, Humes,	Philada.,	Pa.	J. Wyeth & Bro.
Harper, Robert Newton,	Leesbng, Va.	Va.	J. Wyeth & Bro.
Haus, Charles Morris,	Bethlehem,	Pa.	
Headley, Wm. Henry Harrison,	Bristol,	Pa.	H. G. Peters.
Heiberger, Eugene Samuel,	Allentown,	Pa.	Hartzell, Smith & Co.
Heinitsh, Henry Ernest,	Philada.,	Pa.	J. P. Remington.
Henderson, James Ashton,	Maytown,	Pa.	Bullock & Crenshaw.
Hesson, Robert Lewis,	Philada.,	Pa.	H. B. Taylor.
Hillan, John Michael,	St. Clair,	Pa.	S. E. R. Hassinger.
Hinckley, Levi Ellsworth,	Chagrin Falls,	Ohio.	H. Waterman.
Hirst, Levi Brook,	Camden,	N. J.	S. C. Mieschamp.
Hoffman, Ephraim Ziegler,	Maytown,	Pa.	P. M. Ziegler, M. D.
Houck, Calvin Jerome,	Lebanon,	Pa.	J. J. Karch.
Houck, Oscar,	La Crosse,	Wis.	S. Gerhard.
Howey, John Joseph,	Marshall,	Va.	J. Wyeth & Bro.
Hull, John Thompson,	Paulsboro,	N. J.	D. S. Ferguson.
Ischler, George Herman,	Philada.,	Pa.	F. E. Himmelwright.
Johnson, Elmer Ellsworth,	Shenandoah,	Pa.	S. C. Spalding, M. D.
Johnston, Thomas Crawford.	Philada.,	Pa.	K. H. Johnston.
Jordan, Abraham,	Philada.,	Pa.	
Judd, James Frederick,	London,	England.	H. S. Bartlett.
Keller, Fred. Rudolph,	Philada.,	Pa.	G. H. Toboldt.
Keller, George Dering,	Carlisle,	Pa.	S. B. Kieffer, M. D.
Keller, John William,	Altoona,	Pa.	W. H. Irwin.
Kelley, William Clarence,	Chester,	Pa.	F. M. Reed.
Ketchum, Stephen Rush,	Philada.,	Pa.	D. L. Stackhouse.
Klug, Wm., Henri,	Philada.,	Pa.	B. F. Johnson.
Kinsey, Albert Henry,	Gallion,	Ohio.	B. N. Bethel.

Matriculants.	Town or County.	State.	Preceptor.
Klump, George Lewis,	Allentown,	Pa.	C. C. Klump.
Koch, Charles Herman,	Philada.,	Pa.	J. T. Shinn.
Koenig, Wm. Matthew,	R-ading,	Pa.	F. X. Wolf.
Krum, Chas. Franklin,	Catawissa,	Pa.	M. Oswald.
Kusenber, Louis Carl,	Reading,	Pa.	J. B. Raser.
Kutzner, John Deuty,	Shamokin,	Pa.	W. R. Kutzner.
Lammer, Francis Joseph,	Philada.,	Pa.	Dr. L. Wolff.
Lawall, Charles Elmer,	Catasauqua,	Pa.	J. S. Lawall.
Lawbach, Wm. Harrison, Jr.,	Catasauqua,	Pa.	J. Wyeth & Bro.
Leeds, Harry Bellerjeau,	Atlntio City,	N. J.	Dr. C. T. Smith.
Leithead, Robert, Jr.,	Rockland,	Del.	C. H. Clark.
Leonard, Isaac Edward,	White Haven,	Pa.	J. J. Baker, Jr.
Lewe, Clement Belton,	Philada.,	Pa.	
McCarthy, Cornelius Joseph,	Philada.,	Pa.	Bullock & Crenshaw.
McCauley, John Sloan,	Philada.,	Pa.	
McCausland, Jas. Ralston,	Philada.,	Pa.	L. E. Sayre.
McConn, Wm. John,	Philada.,	Pa.	Geo. Blinkhorn.
McCoy, Franklin,	Bellville,	Ohio.	J. C. Potts.
McKee, Alexander,	Philada.,	Pa.	J. Wyeth & Bro.
McKenzie, Tracy,	Mexia,	Texas.	Dr. M. W. Kemp.
McVicker, John Clarence,	Morgantown,	W. Va.	J. M. Reed.
Madlock, George Frederick,	Monmouth,	N. J.	C. H. Gubbins.
Maguire, Andrew Herman Joseph,	England.		W. C. Bakes.
Maisch Henry Charles Christian,	Philada.,	Pa.	L. Wolff, M. D.
Maitland, Henry Wilbur,	Philada.,	Pa.	L. W. Hildenbrand, M. D
Malatesta, Jos. Mark,	Philada.,	Pa.	J. H. Blake.
Mallon, James P.,	Philada.,	Pa.	M. Bond, M. D.
Martin, Emlen,	Rancocos,	N. J.	Dr. W. L. Martin.
Martin, John Edwin,	Jersey Shore,	Pa.	C. E. Kamerly, M. D.
Miller, Harry Lovett, Jr.,	Meris,	Ill.	W. H. Miller.
Mitcheson, Robt. Stockton Johnson,	Philada.,	Pa.	W. R. Warner & Co.
Noerk, Frank Xavier,	Wilmington,	Del.	August Kuhlmann.
Moore, Christian,	Ardmore,	Pa.	S. F. Stadelman.
Morris, John Augustine,	Philada.,	Pa.	W. C. Todd, M. D.
Murjahn, Louis,	Philada.,	Pa.	
Murrow, James White,	Philada.,	Pa.	A. M. Wilson.
Murtagh, John Anthony,	Germantown,	Pa.	Wm. Cenner.
Nock, Thos. Oliver,	Camden,	Del.	W. B. Neck.
Oberheltzer, Chas. Herman,	Phoenixville,	Pa.	L. Oberheltzers Sons & Co.
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Osborne, Melmouth Mercer,	Philada.,	Pa.	L. E. Sayre.
Owen, Gomer David,	Newark,	Ohio.	L. E. Sayre.
Pancoast, George Widdifield,	Mt. Holly,	N. J.	H. Thornton.
Parrish, Callistus Mitchell,	Ebensburg,	Pa.	W. Lemmen, M. D.
Pattengill, Evan Ingstrum,	Elmira,	N. Y.	C. W. Holmes.
Pemberton, Samuel Lovering,	Philada.,	Pa.	Bullock & Crenshaw.
Perrenot, Emile A.,	Alleghany City,	Pa.	J. A. Heintzelman.
Petrie, Edward Sing,	Oswego,	N. Y.	J. C. Morgan.
Pettigrew, Harlan Page,	Sioux Falls,	Daketa.	L. T. Dunning.
Pierce, Wm. Chandler,	Wilmington,	Del.	Smith & Paluter.
Plenge, Henry Charles,	Charleston,	S. C.	G. J. Luhn.
Pool, James Arthur,	Earlville,	Ill.	J. J. Pool.
Preston, Edmund, Jr.,	Fallston,	Md.	W. Procter Jr. Co.
Prickitt, Elmer Delaney,	Mt. Holly,	N. J.	Louis Miller.
Reading, Wm. Van Dyke,	Norristown,	Pa.	F. H. Poley.
Reese, Berch Taylor,	Philada.,	Pa.	W. R. Warner & Co.
Reisert, William,	Philada.,	Pa.	A. H. C. Rowand.
Ridington, Wm. Augustus,	Conshohocken,	Pa.	Wm. McKenzie, M. D.
Riggs, Elias Ellsworth,	Hightstown,	N. J.	G. E. Titus, M. D.
Ritter, Charles Templeton,	Allentown,	Pa.	H. C. Walker.
Rohrer, Joshua Ellis,	Carlisle,	Pa.	J. B. Haverstick.
Rumsey, Walter Arabin,	Salem,	N. J.	D. E. Rice, M. D.
Ryan, Frank Gibbs,	Elmira,	N. Y.	Brown & Dawson.
Santee, Andrew Curtin,	Town Line,	Pa.	J. M. Wert.
Schroder, Luther John-on,	Columbia,	Pa.	P. S. Brugh.
Schuldt, Henry Francis,	Philada.,	Pa.	J. L. Supplee.
Schwartz, Frederick,	Philada.,	Pa.	E. W. Herrmann.
Sharp, Edward Wolf,	Seaville,	N. J.	F. M. Reed.
Sher, Fred. P.,	Philada.,	Pa.	Dr. Sher.
Sherman, Austin Charles,	Girardville,	Pa.	Z. T. Trout.
Singer, Wm. August,	Peoria,	Ill.	A. C. Drewitz.
Smith, Christopher Columbus,	Philada.,	Pa.	J. F. Wilgus.
Smith, James Oscar,	Eldorado,	Ark.	L. Wolff, M. D.
Snyder, Harry Lincoln,	Mechanicsburg,	Pa.	H. A. Borell.
Spangler, George Ellsworth,	Lebanon,	Pa.	Hansell & Bro.
Stager, Edwin Wesley,	Lebanon,	Pa.	J. A. Armstrong, M.D.
Stahl, Benjamin Franklin,	Marietta,	Pa.	Funk & Spencer.
Steinmetz, Charles Mays,	Readin g,	Pa.	Ed. Warrington.
Stiles, Henry Lippincott,	Morestown,	N. J.	J. R. Stevenson.

<i>Matriculants.</i>	<i>Town or County.</i>	<i>State.</i>	<i>Preceptor.</i>
Strasser, John Jacob, Jr.,	Trenton,	N. J.	F. R. Jummel.
Streitz, Alexander Frederick,	North Platte,	Neb.	J. A. Le Fils.
Sypherd, Clarence Draper.	Sadlersville,	Md.	W. A. Higgate, M. D.
Tatem, Henry Randolph,	Collingswood,	N. J.	Conrad & Co.
Tedford, Edward Weeks,	Maryville,	Tenn.	Dr. Arbeely.
Thomas, James Harry,	Philada.,	Pa.	F. Brown.
Thompson, William Cochran,	Coatesville,	Pa.	G. W. Davy.
Trefry, Thomas Crowell,	Yarmouth,	N. S.	Dr. C. A. Black.
Trist, Edwin Allen,	Philada.,	Pa.	Bullock & Crenshaw.
Trout, John Henry,	Chester,	Pa.	J. R. Kauffman.
Urbien, Fred. Lang	Pittsburg.	Pa.	A. B. Urbien.
Valentine, Frank Elliott,	Urbana,	Ohio.	F. S. Case.
Vaughan, Perry Wyche.	Durham,	N. C.	
Ward, John Martin Broomall,	Chester,	Pa.	G. Banks Wilson.
Watson, Wm. Porter,	Clearfield,	Pa.	C. D. Watson.
Weaber, John Alvin,	Fredericksburg,	Pa.	R. B. Heilman.
Weber, Alexander Arthur,	Mahonoy City,	Pa.	J. A. Parker.
Webb, Richard, John.	Scranton,	Pa.	Dr. J. L. Rea.
Webster, Samuel C.,	Philada.,	Pa.	G. C. Webster.
Weirich, George Alcinus,	Minersville,	Pa.	P. A. Bissell.
Wenner, Alfred Jefferson,	Allentown,	N. J.	C. G. Hoell, M. D.
Wetteroth, Henry,	Bordentown,	N. J.	Bunting Hanksins.
Wicknam, Anthony Smith,	Wheeling,	W. Va.	H. B. Taylor.
Wilgus William Alcott.	Bordentown,	Pa.	J. F. Wilgus.
Williams, George Thomas,	Wilmington,	Del.	P. H. Wood.
Wilson, Elmer Ellsworth,	Bucks Co.,	Pa.	Dotts, Beale & Lambert.
Wirth, Adolph Leopold,	Milwaukee,	Wis.	L. Wirth.
Wittiger, Hugo Ottiger.	Bethlehem,	Pa.	J. N. Shoffner.

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# THE AMERICAN JOURNAL OF PHARMACY.

*FEBRUARY, 1884.*

## MEDICATED WATERS.

BY JOSEPH W. ENGLAND, PH. G.

*Read at the Pharmaceutical Meeting, January 15, 1884.*

The term "Medicated Waters" is applied in a general sense to all those aqueous liquids holding in solution the volatile oils of plants, or in some cases the stear<sup>o</sup>pten of a volatile oil e. g. Aqua camphoræ. This definition is only partially adhered to by the Pharmacopœia which also admits under the same heading, aqueous solutions of certain odorous gases and liquids not directly derived from plant life. Through misplacement, therefore, Aqua ammoniæ, Aqua ammoniæ fortior, Aqua chlori and Aqua creasoti have been classified among the officinal waters, the position of which, it is thought, from their composition should have been among the "Liquors." The present paper will deal only with the waters first named; that is those derived from volatile oils; and will have for its scope the various methods of preparations employed, explanations of the several advantages and disadvantages peculiar to each; while a substitutive process will be offered and the principles involved in the workings of the same set forth.

The U. S. Pharmacopœia of 1870, in the formulæ for these waters, gave in all cases, either one or the alternative of two processes. First: Distillation of the odorous part of the plant with water, after previous comminution and maceration if necessary; or, second: Trituration of the volatile oil of the plant with magnesium carbamate, the addition of distilled water and filtration.

During the process of "distillation" the water carries over with it in suspension the vapor of the oily product used and both are condensed in the receiver in separate layers. The oily portion is separated by suitable apparatus, leaving the water impregnated with its taste and fragrance. The fragrance is at first masked with a foreign odor that gradually disappears on exposure to air; leaving the true one, partially modified to one of finer quality, through the supposed presence of certain volatile acids and compound or mixed ethers. Distillation while admittedly the best in comparison with the present methods



pursued, is to a great extent in the limited uses of most pharmacists impracticable for general employment. It requires for its successful exercise, the manufacture on a large scale, great care and skill on the part of its operators, and the use of vegetable products of quality seldom found in commerce to secure the best results. Its general application, therefore, is far from being a universal one.

The process of triturating the oil with magnesium carbonate is directed for the property possessed of reducing, mechanically, the size of the oily globules in order to present a greater surface to the solvent action of the water. The main objection to its use, rests upon the fact of its appreciable solubility in distilled water and to a still greater extent, when ordinary water containing in solution, as it usually does, carbonic oxide. The medicated waters thus made and holding in solution this alkaline-earth salt may, when prescribed with alkaloids, their salts or certain metallic oxides, precipitate them from solution on standing and possibly lead to grave and serious results. To overcome this defect the substitution of paper-pulp, chalk, pumice stone or charcoal has been proposed. These, however, are poor expedients and all fail through their inherent lack of the necessary power of diffusion of the oily ingredient upon trituration. The advantages of the "Trituration Process" to the general pharmacist are so manifold that they scarcely need comment. The readiness of manufacture on a small scale, the short time necessary for its performance with results equally satisfactory, except in a few isolated instances, and the cheapness of preparation are a few of the points of value which yield it preference for general usage.

The late revision of our recognized authority discards, entirely, the use of the "Trituration Process" and employs in its stead a method which consists, simply, in the distribution of the oil, in small portions at a time, upon cotton; picking the same apart after each addition until the whole is thoroughly impregnated with it, packing in a conical glass percolator and displacing with distilled water. The exceptions to this mode are bitter almond water, prepared by direct solution of the oil in water by agitation, rose and orange flower waters made by distillation. A practical acquaintance with this process does not impress one with either its worth or general utility. Its supposed advantages are more than counterbalanced by the very unsatisfactory results arising from its use. In the first place when the oil is added to the cotton, no matter how faithfully its dissemination may be executed, a large pro-

portion is necessarily lost upon the fingers in picking the fibres apart. Then when it is placed in the percolator, if packed too loose, the added water rushes through without dissolving any of the oil. If too tight: the process is impeded to such an extent that percolation becomes impossible. The right degree of packing is hard to obtain and when secured yields but little better results. As to the use of distilled water, very few follow the pharmacopœial directions in this particular. Without exceptions, all pharmacists with whom the author has conversed, substitute ordinary water and claim in extenuation, that extreme purity of that liquid is unnecessary, and that they are perfectly justified in the replacement from the fact that distilled water is frequently of a musty, unpleasant odor, vapid and disagreeable taste and as likely may contain metallic impurities from the uncertain, careless methods of commercial manufacture; further their efficiency is called into question from the physiological fact that distilled water is difficult of digestion and not as acceptable to irritable stomachs. These statements may be regarded as extreme, yet it must be admitted that the greatest efficiency of all medicines is desired, in a physiological sense as well as a pharmaceutical one. If the reasons advanced are tenable and do not arise from economic considerations they are certainly worthy of further notice. Certain it is that the products made by them, seem to give equal satisfaction with those made by standard authority. In whatever way we view the U. S. (1880) process, its wasteful and objectionable manipulations are so evident, that if the imperfections in the directions of the earlier Pharmacopœia (1870) were open to severe comment, those of the latter (1880) are doubly so by comparison.

As previously stated, the greater the subdivision of an oil, when brought in contact with an aqueous solvent, the larger the quantity that will necessarily be taken up in solution. As an aid to this fact and also their supposed insolubility, rests the adaptability of the bodies mentioned above as diffusive agents. Some of the objections to the use of magnesium carbonate and several of its proposed substitutes have already been noted. Upon trial I have found precipitated calcium carbonate to be preferable, mechanically, to the magnesium salt; yet it is open to the same adverse criticisms. Another possibly important objection to the use of alkaline earth carbonates, which has not been previously discussed, may reside in the fact of the presence of odorous volatile acids, ethers, etc., in the volatile oils used and the neutralization of those acids by the alkaline carbonates, to form neutral and

inodorous bodies, which may or may not be soluble. This view is a plausible one when we consider the delicate chemical constitution of the oils in general, especially those containing the previously mentioned compounds. Upon this fact may be based the superiority of "Distilled" over "Triturated" waters, as in distillation the water is impregnated with the oil direct and unchanged; while in trituration, if performed with carbonates, some changes undoubtedly ensue, since the products from the latter process are of less fine qualities than those of the former; although both may be made from the same oil. It is absolutely necessary on this account, to use a body free from these objectionable features and one which has all the essential requisites in the greatest degree. After numerous trials I have found precipitated calcium phosphate to possess all the desired properties and to yield products that were in all respects the equal of those obtained by distillation.

This lime salt is a neutral, impalpable solid, wholly insoluble in water, neutral or carbonated, and when used permits filtration much more readily and effectively than any other medium. In diffusive power it is fully the equal of any of the bodies previously mentioned; leaving nothing to be desired. Before its use, although generally very pure, tests should be always applied to determine that fact. It should be wholly soluble in dilute hydrochloric acid without effervescence (absence of carbonates). Its washings with distilled water should yield no opalescence or precipitate with test solutions of silver nitrate (absence of chlorides), barium chloride (absence of sulphates) or ammonium oxalate (absence of soluble lime salts).

When diffusive agents are used, they require long and persistent trituration with the oil to effect thorough and minute subdivision. In order to promote this diffusion, a plan of diluting the oil with a small quantity of alcohol was tried and found to work admirably. The presumed presence of alcohol in medicated waters thus made, has no foundation in fact, if the directions in the general formula, hereinafter given, are followed, as the rubbing to dryness, necessarily volatilizes the whole of it.

*General Formula.*—"Triturate, in a mortar of broad surface, the oil dissolved in the alcohol, with the precipitated calcium phosphate, until a dry powder is secured and all the alcohol has volatilized, then add the water in small portions at a time, stirring after each addition, until the intended quantity to be made is completed. Lastly, filter; returning to the filter the first portions, if cloudy."



The following formulæ, under each heading, are expressed in two ways. One according to the method of the U. S. P. of 1870, and the other like that of the U. S. P. of 1880.

*Aqua Anethi, Br.*—Oil of dill half a fluidrachm, alcohol one and a half fluidrachms, precipitated calcium phosphate two drachms, distilled water a sufficient quantity to make the finished product measure two pints. Or, oil of dill 2 parts, alcohol 6 parts, precipitated calcium phosphate 8 parts, distilled water a sufficient quantity to make the finished product weigh 1,000 parts.

*Aqua Anisi, U. S.*—Oil of anise half a fluidrachm, alcohol one and a half fluidrachms, precipitated calcium phosphate two drachms, distilled water a sufficient quantity to make the finished product measure two pints. Or, oil of anise 2 parts, alcohol 6 parts, precipitated calcium phosphate 8 parts, distilled water a sufficient quantity to make the finished product weigh 1,000 parts.

*Aqua Aurantii Florum, U. S.*—Oil of neroli (Bigarade) twelve minims, alcohol one and a half fluidrachms, precipitated calcium phosphate two drachms, distilled water a sufficient quantity to make the finished product measure two pints. Or, oil of neroli (Bigarade) 2 parts, alcohol 15 parts, precipitated calcium phosphate 20 parts, distilled water a sufficient quantity to make the finished product weigh 2,500 parts.

*Aqua Amygdalæ Amaræ, U. S.*—Oil of bitter almonds 15 minims, distilled water a sufficient quantity to make the finished product measure two pints. Or, oil of bitter almonds 1 part, distilled water a sufficient quantity to make the finished product weigh 1,000 parts. Dissolve the oil directly in the water by agitation. Since 1 part of the oil is soluble in 300 parts of water, no further directions are necessary.

*Aqua Camphoræ, U. S.*—Camphor two drachms, alcohol one and a half fluidrachms, precipitated calcium phosphate four drachms, distilled water a sufficient quantity to make the finished product measure two pints. Or, camphor 8 parts, alcohol 6 parts, precipitated calcium phosphate 15 parts, distilled water a sufficient quantity to make the finished product weigh 1,000 parts. Reduce the camphor in a mortar to a thin, smooth paste with the alcohol, add the precipitated calcium phosphate, and proceed as in general formula.

*Aqua Cinnamomi, U. S.*—Oil of cinnamon (Ceylon) half a fluidrachm, alcohol one and a half fluidrachms, precipitated calcium phosphate two drachms, distilled water a sufficient quantity to make the finished



product measure two pints. Or, oil of cinnamon (Ceylon) 2 parts, alcohol 6 parts, precipitated calcium phosphate 8 parts, distilled water a sufficient quantity to make the finished product weigh 1,000 parts.

*Aqua Fœniculi, U. S.*—Oil of fennel half a fluidrachm, alcohol one and a half fluidrachms, precipitated calcium phosphate two drachms, distilled water a sufficient quantity to make the finished product measure two pints. Or, oil of fennel 2 parts, alcohol 6 parts, precipitated calcium phosphate 8 parts, distilled water a sufficient quantity to make the finished product weigh 1,000 parts.

*Aqua Menthæ Piperitæ, U. S.*—Oil of peppermint half a fluidrachm, alcohol one and a half fluidrachms, precipitated calcium phosphate two drachms, distilled water a sufficient quantity to make the finished product measure two pints. Or, oil of peppermint 2 parts, alcohol 6 parts, precipitated calcium phosphate 8 parts, distilled water a sufficient quantity to make the finished product weigh 1,000 parts.

*Aqua Menthæ Viridis, U. S.*—Oil of Spearmint half a fluidrachm, alcohol one and a half fluidrachms, precipitated calcium phosphate two drachms, distilled water a sufficient quantity to make the finished product measure two pints. Or, oil of spearmint 2 parts, alcohol 6 parts, precipitated calcium phosphate 8 parts, distilled water a sufficient quantity to make the finished product weigh 1,000 parts.

*Aqua Pimentæ, Br.*—Oil of allspice half a fluidrachm, alcohol one and a half fluidrachms, precipitated calcium phosphate two drachms, distilled water a sufficient quantity to make the finished product measure two pints. Or, oil of allspice 2 parts, alcohol 6 parts, precipitated calcium phosphate 8 parts, distilled water a sufficient quantity to make the finished product weigh 1,000 parts.

*Aqua Rosæ, U. S.*—Oil of rose six minims, alcohol one fluidrachm, precipitated calcium phosphate two drachms, distilled water a sufficient quantity to make the finished product measure two pints. Or, oil of rose 2 parts, alcohol thirty parts, precipitated calcium phosphate 40 parts, distilled water a sufficient quantity to make the finished product weigh 5,000 parts.

In conclusion, the author, in advocating the adoption of the preceding formulæ would say that any means used to insure success, are always secondary in importance to the quality of the materials used. No process, however good in itself, can hope to remedy defects in the qualities of its ingredients, or the hasty, careless manipulations of its operators. With these guarded against, there need be no disappointment in the results obtained.

# TABLES OF PERCENTAGE AND SPECIFIC GRAVITY OF ALCOHOL.

BY GUSTAVUS PILE.

*Read at the Pharmaceutical Meeting, January 15, 1884.*

In a paper read at one of the Phaamaceutical Meetings last spring, I called attention to the alcohol tables of the Pharmacopœia of 1880, and showed that they differed materially from the scale of Tralles, and might mislead one in determining the value of alcoholic mixtures. Alcohol having a specific gravity of .8157 has been regarded as 95 per cent. for so long a time that it would seem to be difficult to interpret it any other way, but by the adoption of the tables of Hohner, such will be the case, and 95 per cent. will have a specific gravity of .8161, and so on.

In order to show some of the differences between the two tables, I give a few of the percentages from each, side by side, the variations between them being seen at a glance.

Specific Gravity.	Tralles		Hohner.	
	Weight.	Volume.	Weight.	Volume.
1.0000	.....	.....	.00	.00
.9857	8.05	10.00	8.86	11.00
.9751	16.29	20.00	17.17	21.09
.9646	24.69	30.00	25.43	30.90
.9510	33.39	40.00	34.05	40.79
.9335	42.52	50.00	43.00	50.57
.9126	52.19	60.00	52.41	60.25
.8892	62.50	70.00	62.73	70.27
.8631	73.59	80.00	73.75	80.19
.8332	85.75	90.00	85.96	90.23
.7939	100.00	100.00	99.97	99.98

As will be here seen, the alcoholometers as now made will necessitate a correction each time they are used; and to me, as a maker of them, the question will be which table to follow in the future. I endeavor to have my hydrometers true to as small a fraction as it is possible to read them, but these tables show variations from .02 up to nearly 2 whole degrees, a fact that cannot but lead to confusion. This is unfortunate, and is about equivalent to having a new value placed on the present fluidounce, and asking the pharmacist either to make an allowance when using his graduates, or else throw them aside and procure a new supply.

Being convinced of the unfeasibility of displacing the scale of

Tralles in this country, I have given considerable time to preparing the following tables from that scale, and after the same extended form as those published in the Pharmacopœia. They indicate, for each degree of specific gravity, the percentage of absolute alcohol, both by weight and volume, from water having a specific gravity of .9991 at 60° Fahr., to absolute alcohol of .7939 at the same temperature. These tables will be found to meet every requirement, and, at the same time, free from the inaccuracies that exist in those before noticed.

Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.	
	By Weight.	By Volume.		By Weight.	By Volume.		By Weight.	By Volume.
.9991 0	.00 .05	.00 .06						
.9989 8	.10 .16	.13 .19	.9949 8	2.29 2.34	2.86 2.93	.9909 .8	4.61 4.68	5.77 5.85
7	.21 .26	.26 .33	7	2.40 2.46	3.00 3.07	7	4.71 4.80	5.92 6.00
6	.32 .37	.40 .46	6	2.51 2.57	3.14 3.22	6	4.86 4.93	6.08 6.16
5	.42 .48	.53 .60	5	2.63 2.68	3.29 3.36	5	4.99 5.05	6.23 6.31
4	.53 .58	.66 .73	4	2.74 2.80	3.43 3.50	4	5.11 5.18	6.39 6.46
3			3			3		
2			2			2		
1			1			1		
0			0			0		
.9879 8	.64 .69	.80 .86	.9939 8	2.86 2.91	3.57 3.64	.9899 8	5.21 5.30	6.54 6.62
7	.74 .80	.93 1.00	7	2.97 3.03	3.71 3.79	7	5.37 5.43	6.69 6.77
6	.85 .90	1.06 1.13	6	3.09 3.14	3.86 3.93	6	5.49 5.56	6.85 6.92
5	.96 1.01	1.19 1.26	5	3.20 3.26	4.00 4.07	5	5.62 5.69	7.00 7.08
4	1.06 1.12	1.33 1.40	4	3.31 3.37	4.14 4.21	4	5.76 5.82	7.16 7.25
3			3			3		
2			2			2		
1			1			1		
0			0			0		
.9969 8	1.17 1.22	1.46 1.53	.9929 8	3.43 3.48	4.29 4.36	.9889 8	5.89 5.96	7.33 7.41
7	1.28 1.33	1.60 1.66	7	3.54 3.60	4.43 4.50	7	6.02 6.09	7.50 7.58
6	1.38 1.44	1.73 1.80	6	3.65 3.71	4.57 4.64	6	6.16 6.22	7.66 7.75
5	1.49 1.54	1.86 1.93	5	3.77 3.82	4.71 4.78	5	6.29 6.36	7.83 7.91
4	1.60 1.66	2.00 2.07	4	3.88 3.94	4.86 4.93	4	6.43 6.50	8.00 8.08
3			3			3		
2			2			2		
1			1			1		
0			0			0		
.9959 8	1.72 1.77	2.14 2.21	.9919 8	4.00 4.06	5.00 5.08	.9879 8	6.57 6.63	8.16 8.25
7	1.83 1.89	2.28 2.36	7	4.12 4.18	5.16 5.23	7	6.70 6.77	8.33 8.41
6	1.95 2.00	2.43 2.50	6	4.24 4.30	5.31 5.39	6	6.84 6.90	8.50 8.58
5	2.06 2.12	2.57 2.64	5	4.37 4.43	5.46 5.54	5	6.97 7.04	8.66 8.75
4	2.17 2.23	2.72 2.79	4	4.49 4.55	5.62 5.69	4	7.11 7.17	8.83 8.91
3			3			3		
2			2			2		
1			1			1		
0			0			0		

Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.	
	By Weight.	By Volume.		By Weight.	By Volume.		By Weight.	By Volume.
.9869	7.24	9.00	.9809	11.56	14.30	.9749	16.46	20.20
8	7.31	9.08	8	11.64	14.40	8	16.54	20.30
7	7.37	9.16	7	11.73	14.50	7	16.63	20.40
6	7.44	9.25	6	11.81	14.60	6	16.71	20.50
5	7.51	9.33	5	11.89	14.70	5	16.79	20.60
4	7.58	9.41	4	11.98	14.80	4	16.87	20.70
3	7.64	9.50	3	12.06	14.90	3	16.96	20.80
2	7.71	9.58	2	12.14	15.00	2	17.04	20.90
1	7.78	9.66	1	12.22	15.09	1	17.12	21.00
0	7.84	9.75	0	12.30	15.18	0	17.21	21.10
.9859	7.91	9.83	.9799	12.37	15.27	.9739	17.29	21.20
8	7.98	9.91	8	12.45	15.36	8	17.37	21.30
7	8.05	10.00	7	12.53	15.45	7	17.46	21.40
6	8.12	10.08	6	12.60	15.54	6	17.54	21.50
5	8.18	10.16	5	12.68	15.63	5	17.62	21.60
4	8.24	10.25	4	12.75	15.72	4	17.70	21.70
3	8.31	10.33	3	12.83	15.81	3	17.79	21.80
2	8.38	10.41	2	12.90	15.90	2	17.87	21.90
1	8.45	10.50	1	12.97	16.00	1	17.95	22.00
0	8.51	10.58	0	13.05	16.10	0	18.03	22.09
.9849	8.58	10.66	.9789	13.13	16.20	.9729	18.10	22.18
8	8.65	10.75	8	13.22	16.30	8	18.18	22.27
7	8.72	10.83	7	13.30	16.40	7	18.25	22.36
6	8.79	10.91	6	13.38	16.50	6	18.33	22.45
5	8.86	11.00	5	13.47	16.60	5	18.40	22.54
4	8.94	11.09	4	13.55	16.70	4	18.48	22.63
3	9.01	11.18	3	13.63	16.80	3	18.55	22.72
2	9.09	11.27	2	13.72	16.90	2	18.63	22.81
1	9.16	11.36	1	13.80	17.00	1	18.70	22.90
0	9.24	11.45	0	13.88	17.10	0	18.78	23.00
.9839	9.31	11.54	.9779	13.97	17.20	.9719	18.87	23.10
8	9.39	11.63	8	14.05	17.30	8	18.95	23.20
7	9.46	11.72	7	14.13	17.40	7	19.04	23.30
6	9.54	11.81	6	14.22	17.50	6	19.12	23.40
5	9.62	11.90	5	14.30	17.60	5	19.20	23.50
4	9.68	12.00	4	14.38	17.70	4	19.29	23.60
3	9.75	12.09	3	14.47	17.80	3	19.37	23.70
2	9.83	12.18	2	14.55	17.90	2	19.45	23.80
1	9.90	12.27	1	14.63	18.00	1	19.54	23.90
0	9.98	12.36	0	14.72	18.10	0	19.62	24.00
.9829	10.05	12.45	.9769	14.80	18.20	.9709	19.71	24.10
8	10.13	12.54	8	14.88	18.30	8	19.79	24.20
7	10.20	12.63	7	14.97	18.40	7	19.87	24.30
6	10.28	12.72	6	15.05	18.50	6	19.96	24.40
5	10.35	12.81	5	15.13	18.60	5	20.04	24.50
4	10.43	12.90	4	15.21	18.70	4	20.12	24.60
3	10.50	13.00	3	15.30	18.80	3	20.21	24.70
2	10.58	13.09	2	15.38	18.90	2	20.29	24.80
1	10.65	13.18	1	15.46	19.00	1	20.37	24.90
0	10.73	13.27	0	15.55	19.10	0	20.46	25.00
.9819	10.80	13.36	.9759	15.63	19.20	.9699	20.54	25.10
8	10.88	13.45	8	15.71	19.30	8	20.61	25.19
7	10.95	13.54	7	15.80	19.40	7	20.69	25.28
6	11.03	13.63	6	15.88	19.50	6	20.77	25.37
5	11.10	13.72	5	15.96	19.60	5	20.84	25.46
4	11.18	13.81	4	16.05	19.70	4	20.92	25.55
3	11.25	13.90	3	16.13	19.80	3	21.00	25.64
2	11.32	14.00	2	16.21	19.90	2	21.07	25.73
1	11.40	14.10	1	16.29	20.00	1	21.15	25.82
0	11.48	14.20	0	16.38	20.10	0	21.23	25.91



Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.	
	By Weight.	By Volume.		By Weight.	By Volume.		By Weight.	By Volume.
.9689	21.30	26.00	.9629	25.90	31.12	.9569	29.92	36.07
8	21.38	26.10	8	25.97	31.50	8	29.98	36.14
7	21.47	26.20	7	26.05	31.59	7	30.05	36.22
6	21.55	26.30	6	26.12	31.67	6	30.11	36.29
5	21.63	26.40	5	26.19	31.75	5	30.17	36.36
4	21.72	26.50	4	26.26	31.84	4	30.24	36.43
3	21.80	26.60	3	26.33	31.92	3	30.30	36.50
2	21.88	26.70	2	26.40	32.00	2	30.36	36.58
1	21.97	26.80	1	26.47	32.08	1	30.43	36.65
0	22.05	26.90	0	26.53	32.15	0	30.49	36.72
.9679	22.14	27.00	.9619	26.60	32.23	.9559	30.55	36.79
8	22.22	27.10	8	26.67	32.31	8	30.62	36.86
7	22.30	27.19	7	26.73	32.38	7	30.68	36.93
6	22.38	27.28	6	26.80	32.46	6	30.74	37.00
5	22.45	27.37	5	26.87	32.54	5	30.80	37.07
4	22.53	27.45	4	26.93	32.61	4	30.86	37.14
3	22.61	27.55	3	27.00	32.69	3	30.92	37.20
2	22.68	27.64	2	27.07	32.77	2	30.98	37.27
1	22.76	27.73	1	27.13	32.84	1	31.04	37.34
0	22.84	27.82	0	27.20	32.92	0	31.10	37.40
.9669	22.91	27.91	.9609	27.26	33.00	.9549	31.15	37.47
8	22.99	28.00	8	27.33	33.08	8	31.21	37.54
7	23.07	28.10	7	27.40	33.15	7	31.27	37.60
6	23.15	28.19	6	27.46	33.23	6	31.33	37.67
5	23.22	28.28	5	27.53	33.31	5	31.39	37.74
4	23.30	28.37	4	27.60	33.38	4	31.45	37.80
3	23.38	28.46	3	27.66	33.46	3	31.50	37.87
2	23.45	28.55	2	27.73	33.54	2	31.56	37.94
1	23.53	28.64	1	27.80	33.61	1	31.62	38.00
0	23.61	28.73	0	27.86	33.69	0	31.68	38.07
.9659	23.68	28.82	.9599	27.93	33.77	.9539	31.74	38.14
8	23.76	28.91	8	28.00	33.84	8	31.80	38.20
7	23.84	29.00	7	28.06	33.92	7	31.86	38.27
6	23.92	29.10	6	28.12	34.00	6	31.92	38.34
5	24.00	29.19	5	28.19	34.08	5	31.97	38.40
4	24.07	29.28	4	28.26	34.15	4	32.03	38.47
3	24.15	29.37	3	28.32	34.23	3	32.09	38.54
2	24.23	29.46	2	28.39	34.31	2	32.15	38.60
1	24.31	29.55	1	28.46	34.38	1	32.21	38.67
0	24.38	29.64	0	28.52	34.46	0	32.27	38.74
.9649	24.46	29.73	.9589	28.59	34.54	.9529	32.33	38.80
8	24.54	29.82	8	28.66	34.61	8	32.38	38.87
7	24.61	29.91	7	28.72	34.69	7	32.44	38.94
6	24.69	30.00	6	28.79	34.77	6	32.50	39.00
5	24.76	30.09	5	28.86	34.84	5	32.55	39.06
4	24.83	30.17	4	28.92	34.92	4	32.61	39.12
3	24.90	30.25	3	28.99	35.00	3	32.66	39.18
2	24.98	30.34	2	29.06	35.08	2	32.72	39.25
1	25.05	30.42	1	29.12	35.15	1	32.77	39.31
0	25.12	30.50	0	29.19	35.23	0	32.83	39.37
.9639	25.19	30.59	.9579	29.26	35.31	.9519	32.88	39.43
8	25.26	30.67	8	29.32	35.38	8	32.94	39.50
7	25.33	30.75	7	29.39	35.46	7	33.00	39.56
6	25.40	30.84	6	29.46	35.54	6	33.05	39.62
5	25.47	30.92	5	29.52	35.61	5	33.11	39.68
4	25.54	31.00	4	29.59	35.69	4	33.16	39.75
3	25.61	31.09	3	29.66	35.77	3	33.22	39.81
2	25.68	31.17	2	29.72	35.84	2	33.28	39.87
1	25.76	31.25	1	29.79	35.92	1	33.33	39.93
0	25.83	31.34	0	29.86	36.00	0	33.39	40.00

Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.	
	By Weight.	By Volume.		By Weight.	By Volume.		By Weight.	By Volume.
•9509	33'44	40'06	•9449	36'73	43'70	•9389	39'84	47'11
8	33'50	40'12	8	36'78	43'76	8	39'89	47'17
7	33'56	40'18	7	36'83	43'82	7	39'94	47'22
6	33'61	40'25	6	36'89	43'88	6	40'00	47'28
5	33'67	40'31	5	36'94	43'94	5	40'05	47'33
4	33'73	40'37	4	36'99	44'00	4	40'10	47'39
3	33'78	40'43	3	37'05	44'06	3	40'15	47'44
2	33'84	40'50	2	37'10	44'12	2	40'20	47'50
1	33'90	40'56	1	37'15	44'18	1	40'25	47'55
0	33'95	40'62	0	37'21	44'23	0	40'30	47'61
•9409	34'01	40'68	•9439	37'26	44'29	•9379	40'35	47'66
8	34'06	40'75	8	37'31	44'35	8	40'40	47'72
7	34'12	40'81	7	37'37	44'41	7	40'45	47'77
6	34'17	40'87	6	37'42	44'47	6	40'51	47'83
5	34'23	40'93	5	37'47	44'53	5	40'56	47'88
4	34'28	41'00	4	37'53	44'59	4	40'61	47'94
3	34'34	41'06	3	37'58	44'65	3	40'66	48'00
2	34'40	41'12	2	37'63	44'70	2	40'71	48'05
1	34'45	41'18	1	37'69	44'76	1	40'76	48'10
0	34'51	41'25	0	37'74	44'82	0	40'81	48'16
•9489	34'57	41'31	•9429	37'79	44'88	•9369	40'86	48'21
8	34'62	41'37	8	37'85	44'94	8	40'91	48'26
7	34'68	41'43	7	37'90	45'00	7	40'96	48'32
6	34'74	41'50	6	37'95	45'05	6	41'00	48'37
5	34'79	41'56	5	38'00	45'11	5	41'05	48'42
4	34'85	41'62	4	38'05	45'17	4	41'10	48'48
3	34'91	41'68	3	38'10	45'22	3	41'15	48'53
2	34'96	41'75	2	38'15	45'28	2	41'20	48'58
1	35'01	41'81	1	38'20	45'33	1	41'25	48'64
0	35'07	41'87	0	38'25	45'39	0	41'30	48'69
•9479	35'13	41'93	•9419	38'31	45'45	•9359	41'35	48'74
8	35'18	42'00	8	38'36	45'50	8	41'40	48'80
7	35'23	42'06	7	38'41	45'56	7	41'44	48'85
6	35'28	42'12	6	38'46	45'61	6	41'49	48'90
5	35'34	42'18	5	38'51	45'67	5	41'54	48'95
4	35'39	42'24	4	38'56	45'73	4	41'59	49'00
3	35'44	42'30	3	38'61	45'78	3	41'64	49'06
2	35'50	42'35	2	38'67	45'84	2	41'69	49'11
1	35'55	42'41	1	38'72	45'89	1	41'74	49'16
0	35'60	42'47	0	38'77	45'95	0	41'79	49'22
•9469	35'66	42'53	•9409	38'82	46'00	•9349	41'84	49'27
8	35'71	42'59	8	38'87	46'06	8	41'89	49'32
7	35'76	42'65	7	38'92	46'12	7	41'94	49'38
6	35'82	42'70	6	38'97	46'17	6	41'98	49'43
5	35'87	42'76	5	39'02	46'23	5	42'03	49'48
4	35'92	42'82	4	39'08	46'28	4	42'08	49'53
3	35'98	42'88	3	39'13	46'34	3	42'13	49'59
2	36'03	42'94	2	39'18	46'40	2	42'18	49'64
1	36'08	43'00	1	39'23	46'45	1	42'23	49'69
0	36'14	43'06	0	39'28	46'51	0	42'28	49'75
•9459	36'19	43'12	•9399	39'33	46'56	•9339	42'33	49'80
8	36'24	43'18	8	39'38	46'62	8	42'38	49'85
7	36'30	43'23	7	39'43	46'68	7	42'42	49'90
6	36'35	43'29	6	39'49	46'73	6	42'47	49'95
5	36'40	43'35	5	39'54	46'79	5	42'52	50'00
4	36'46	43'41	4	39'59	46'84	4	42'57	50'05
3	36'51	43'47	3	39'64	46'90	3	42'62	50'10
2	36'56	43'53	2	39'69	46'95	2	42'66	50'15
1	36'62	43'59	1	39'74	47'00	1	42'71	50'20
0	36'67	43'65	0	39'79	47'06	0	42'76	50'25

Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.	
	By Weight.	By Volume.		By Weight.	By Volume.		By Weight.	By Volume.
·9320	42·80	50·30	·9260	45·64	53·29	·9209	48·46	56·19
8	42·85	50·35	8	45·68	53·34	8	48·51	56·24
7	42·90	50·40	7	45·73	53·38	7	48·55	56·28
6	42·94	50·45	6	45·77	53·43	6	48·60	56·33
5	42·99	50·50	5	45·82	53·48	5	48·65	56·38
4	43·04	50·55	4	45·86	53·53	4	48·69	56·43
3	43·08	50·60	3	45·91	53·57	3	48·74	56·47
2	43·13	50·65	2	45·95	53·62	2	48·79	56·52
1	43·18	50·70	1	46·00	53·67	1	48·83	56·57
0	43·22	50·75	0	46·05	53·72	0	48·88	56·62
·9319	43·27	50·80	·9259	46·09	53·76	·9199	48·93	56·66
8	43·32	50·85	8	46·14	53·81	8	48·97	56·71
7	43·36	50·90	7	46·19	53·86	7	49·02	56·76
6	43·41	50·95	6	46·23	53·90	6	49·07	56·81
5	43·46	51·00	5	46·28	53·95	5	49·11	56·85
4	43·51	51·05	4	46·33	54·00	4	49·16	56·90
3	43·55	51·10	3	46·38	54·05	3	49·21	56·95
2	43·60	51·15	2	46·43	54·10	2	49·25	57·00
1	43·65	51·20	1	46·48	54·15	1	49·30	57·04
0	43·69	51·25	0	46·52	54·20	0	49·34	57·09
·9309	43·74	51·30	·9249	46·57	54·25	·9189	49·38	57·14
8	43·79	51·35	8	46·62	54·30	8	49·43	57·18
7	43·84	51·40	7	46·67	54·35	7	49·47	57·23
6	43·88	51·45	6	46·71	54·40	6	49·52	57·28
5	43·93	51·50	5	46·76	54·45	5	49·56	57·32
4	43·98	51·55	4	46·81	54·50	4	49·61	57·37
3	44·03	51·60	3	46·86	54·55	3	49·65	57·41
2	44·08	51·65	2	46·91	54·60	2	49·69	57·46
1	44·12	51·70	1	46·95	54·65	1	49·74	57·51
0	44·17	51·75	0	47·00	54·70	0	49·78	57·55
·9299	44·22	51·80	·9239	47·05	54·75	·9179	49·83	57·60
8	44·27	51·85	8	47·10	54·80	8	49·87	57·64
7	44·31	51·90	7	47·15	54·85	7	49·92	57·69
6	44·36	51·95	6	47·20	54·90	6	49·96	57·74
5	44·41	52·00	5	47·25	54·95	5	50·00	57·78
4	44·46	52·05	4	47·30	55·00	4	50·05	57·83
3	44·50	52·10	3	47·35	55·05	3	50·09	57·87
2	44·55	52·15	2	47·40	55·10	2	50·14	57·92
1	44·60	52·20	1	47·44	55·14	1	50·18	57·96
0	44·65	52·25	0	47·49	55·19	0	50·23	58·00
·9289	44·69	52·30	·9229	47·54	55·24	·9169	50·27	58·05
8	44·74	52·35	8	47·59	55·29	8	50·32	58·09
7	44·79	52·40	7	47·63	55·33	7	50·36	58·14
6	44·84	52·45	6	47·68	55·38	6	50·41	58·19
5	44·88	52·50	5	47·73	55·43	5	50·45	58·23
4	44·93	52·55	4	47·77	55·48	4	50·50	58·28
3	44·98	52·60	3	47·82	55·52	3	50·54	58·32
2	45·03	52·65	2	47·87	55·57	2	50·59	58·37
1	45·07	52·70	1	47·91	55·62	1	50·63	58·42
0	45·12	52·75	0	47·96	55·67	0	50·68	58·46
·9279	45·17	52·80	·9219	48·00	55·71	·9159	50·72	58·51
8	45·22	52·85	8	48·05	55·76	8	50·76	58·55
7	45·27	52·90	7	48·09	55·81	7	50·81	58·60
6	45·32	52·95	6	48·14	55·86	6	50·85	58·64
5	45·37	53·00	5	48·18	55·90	5	50·89	58·69
4	45·41	53·05	4	48·23	55·95	4	50·94	58·73
3	45·46	53·10	3	48·27	56·00	3	50·98	58·78
2	45·50	53·15	2	48·32	56·05	2	51·03	58·82
1	45·55	53·19	1	48·37	56·09	1	51·07	58·87
0	45·59	53·24	0	48·41	56·14	0	51·12	58·92

Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.	
	By Weight.	By Volume.		By Weight.	By Volume.		By Weight.	By Volume.
*9149	51.16	58.96	*9089	53.86	61.68	*9029	56.52	64.80
8	51.21	59.00	8	53.90	61.73	8	56.57	64.84
7	51.25	59.05	7	53.95	61.77	7	56.61	64.89
6	51.30	59.09	6	54.00	61.82	6	56.66	64.93
5	51.34	59.14	5	54.04	61.86	5	56.70	64.97
4	51.39	59.19	4	54.09	61.91	4	56.75	65.02
3	51.43	59.23	3	54.13	61.95	3	56.79	65.06
2	51.48	59.28	2	54.18	62.00	2	56.84	65.10
1	51.52	59.32	1	54.22	62.04	1	56.88	65.15
0	51.57	59.37	0	54.26	62.08	0	56.93	65.19
*9139	51.61	59.41	*9079	54.31	62.13	*9019	56.97	64.73
8	51.66	59.46	8	54.35	62.17	8	57.02	64.78
7	51.70	59.50	7	54.40	62.21	7	57.06	64.82
6	51.75	59.55	6	54.44	62.26	6	57.11	64.87
5	51.79	59.59	5	54.48	62.30	5	57.15	64.91
4	51.83	59.64	4	54.53	62.34	4	57.20	64.95
3	51.88	59.68	3	54.57	62.39	3	57.24	65.00
2	51.92	59.73	2	54.61	62.43	2	57.29	65.04
1	51.97	59.77	1	54.66	62.47	1	57.33	65.08
0	52.01	59.82	0	54.70	62.52	0	57.37	65.12
*9129	52.06	59.86	*9069	54.75	62.56	*9009	57.42	65.16
8	52.10	59.91	8	54.79	62.60	8	57.46	65.20
7	52.15	59.95	7	54.83	62.65	7	57.50	65.25
6	52.19	60.00	6	54.88	62.69	6	57.55	65.29
5	52.24	60.05	5	54.92	62.73	5	57.59	65.33
4	52.28	60.09	4	54.97	62.78	4	57.64	65.37
3	52.33	60.14	3	55.01	62.82	3	57.68	65.41
2	52.37	60.19	2	55.05	62.87	2	57.72	65.45
1	52.42	60.23	1	55.10	62.91	1	57.77	65.50
0	52.46	60.28	0	55.14	62.95	0	57.82	65.54
*9119	52.51	60.32	*9059	55.19	63.00	*8999	57.86	65.58
8	52.55	60.37	8	55.23	63.04	8	57.90	65.62
7	52.60	60.41	7	55.27	63.08	7	57.95	65.66
6	52.64	60.46	6	55.32	63.13	6	57.99	65.70
5	52.69	60.50	5	55.36	63.17	5	58.03	65.75
4	52.73	60.55	4	55.41	63.21	4	58.08	65.79
3	52.78	60.59	3	55.45	63.26	3	58.12	65.83
2	52.82	60.64	2	55.49	63.30	2	58.16	65.87
1	52.87	60.68	1	55.54	63.34	1	58.21	65.91
0	52.91	60.73	0	55.58	63.39	0	58.25	65.95
*9109	52.96	60.77	*9049	55.63	63.43	*8989	58.29	66.00
8	53.00	60.82	8	55.67	63.47	8	58.34	66.04
7	53.05	60.86	7	55.71	63.52	7	58.38	66.08
6	53.09	60.91	6	55.76	63.56	6	58.42	66.12
5	53.14	60.95	5	55.80	63.60	5	58.47	66.16
4	53.18	61.00	4	55.85	63.65	4	58.51	66.20
3	53.23	61.05	3	55.89	63.69	3	58.56	66.25
2	53.27	61.09	2	55.94	63.73	2	58.60	66.29
1	53.32	61.14	1	55.98	63.78	1	58.64	66.33
0	53.36	61.19	0	56.02	63.82	0	58.69	66.37
*9099	53.41	61.23	*9039	56.07	63.87	*8979	58.73	66.41
8	53.45	61.28	8	56.12	63.91	8	58.77	66.45
7	53.50	61.32	7	56.16	63.95	7	58.82	66.50
6	53.54	61.37	6	56.21	64.00	6	58.86	66.54
5	53.59	61.41	5	56.25	64.04	5	58.91	66.58
4	53.63	61.46	4	56.30	64.08	4	58.95	66.62
3	53.68	61.50	3	56.34	64.13	3	59.00	66.66
2	53.72	61.55	2	56.39	64.17	2	59.04	66.70
1	53.77	61.59	1	56.43	64.21	1	59.08	66.75
0	53.81	61.64	0	56.48	64.26	0	59.13	66.79



Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.	
	By Weight.	By Volume.		By Weight.	By Volume.		By Weight.	By Volume.
.8969	59.17	66.83	.8909	61.78	69.32	.8819	64.32	71.72
8	59.21	66.87	8	61.83	69.35	8	64.37	71.76
7	59.25	66.91	7	61.87	69.40	7	64.41	71.80
6	59.30	66.95	6	61.91	69.44	6	64.45	71.84
5	59.34	67.00	5	61.95	69.48	5	64.50	71.88
4	59.38	67.04	4	62.00	69.52	4	64.54	71.92
3	59.43	67.08	3	62.04	69.56	3	64.58	71.96
2	59.47	67.12	2	62.08	69.60	2	64.63	72.00
1	59.52	67.16	1	62.12	69.64	1	64.67	72.04
0	59.56	67.21	0	62.16	69.68	0	64.71	72.08
.8959	59.60	67.25	.8899	62.21	69.72	.8839	64.76	72.12
8	59.65	67.29	8	62.25	69.76	8	64.80	72.16
7	59.69	67.33	7	62.29	69.80	7	64.84	72.20
6	59.74	67.38	6	62.33	69.84	6	64.89	72.24
5	59.78	67.42	5	62.37	69.88	5	64.93	72.28
4	59.82	67.46	4	62.42	69.92	4	64.97	72.32
3	59.87	67.50	3	62.46	69.96	3	65.02	72.36
2	59.91	67.54	2	62.50	70.00	2	65.06	72.40
1	59.96	67.59	1	62.54	70.04	1	65.10	72.44
0	59.00	67.63	0	62.58	70.08	0	65.14	72.48
.8949	60.04	67.67	.8889	62.62	70.12	.8829	65.19	72.52
8	60.09	67.71	8	62.67	70.16	8	65.23	72.56
7	60.13	67.75	7	62.71	70.20	7	65.27	72.60
6	60.18	67.80	6	62.75	70.24	6	65.32	72.64
5	60.22	67.84	5	62.79	70.28	5	65.36	72.68
4	60.26	67.88	4	62.84	70.32	4	65.40	72.72
3	60.31	67.92	3	62.88	70.36	3	65.44	72.76
2	60.35	67.96	2	62.92	70.40	2	65.49	72.80
1	60.39	68.00	1	62.96	70.44	1	65.53	72.84
0	60.44	68.05	0	63.01	70.48	0	65.57	72.88
.8939	60.48	68.09	.8879	63.05	70.52	.8819	65.62	72.92
8	60.52	68.13	8	63.09	70.56	8	65.66	72.96
7	60.57	68.18	7	63.13	70.60	7	65.71	73.00
6	60.61	68.22	6	63.18	70.64	6	65.75	73.04
5	60.66	68.26	5	63.22	70.68	5	65.79	73.08
4	60.70	68.30	4	63.26	70.72	4	65.83	73.12
3	60.74	68.34	3	63.30	70.76	3	65.88	73.16
2	60.79	68.38	2	63.35	70.80	2	65.92	73.20
1	60.83	68.43	1	63.39	70.84	1	65.96	73.24
0	60.88	68.47	0	63.43	70.88	0	66.00	73.28
.8929	60.92	68.51	.8869	63.47	70.92	.8809	66.05	73.31
8	60.96	68.55	8	63.52	70.96	8	66.09	73.35
7	61.01	68.59	7	63.56	71.00	7	66.13	73.39
6	61.05	68.63	6	63.60	71.04	6	66.17	73.43
5	61.10	68.67	5	63.64	71.08	5	66.22	73.47
4	61.14	68.72	4	63.69	71.12	4	66.26	73.51
3	61.18	68.76	3	63.73	71.16	3	66.30	73.54
2	61.23	68.80	2	63.77	71.20	2	66.35	73.58
1	61.27	68.84	1	63.81	71.24	1	66.39	73.62
0	61.31	68.88	0	63.86	71.28	0	66.43	73.66
.8919	61.36	68.92	.8859	63.90	71.32	.8799	66.48	73.70
8	61.40	68.96	8	63.94	71.36	8	66.52	73.74
7	61.44	69.00	7	63.98	71.40	7	66.56	73.78
6	61.49	69.04	6	64.03	71.44	6	66.60	73.81
5	61.53	69.08	5	64.07	71.48	5	66.65	73.85
4	61.57	69.12	4	64.11	71.52	4	66.69	73.89
3	61.61	69.16	3	64.15	71.56	3	66.73	73.93
2	61.66	69.20	2	64.20	71.60	2	66.77	73.97
1	61.70	69.24	1	64.24	71.64	1	66.81	74.00
0	61.74	69.28	0	64.28	71.68	0	66.86	74.04

Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.	
	By Weight.	By Volume.		By Weight.	By Volume.		By Weight.	By Volume.
.8789	66.90	74.08	.8729	69.47	76.37	.8669	71.98	78.60
8	66.91	74.12	8	69.53	76.41	8	72.02	78.63
7	66.99	74.16	7	69.57	76.45	7	72.06	78.67
6	67.03	74.20	6	69.61	76.48	6	72.11	78.71
5	67.07	74.23	5	69.65	76.52	5	72.15	78.74
4	67.12	74.27	4	69.69	76.56	4	72.19	78.78
3	67.16	74.31	3	69.73	76.60	3	72.23	78.82
2	67.20	74.35	2	69.77	76.63	2	72.27	78.85
1	67.25	74.39	1	69.81	76.67	1	72.32	78.89
0	67.29	74.43	0	69.85	76.71	0	72.36	78.93
.8779	67.33	74.46	.8719	69.89	76.74	.8659	72.40	78.97
8	67.38	74.50	8	69.93	76.78	8	72.45	79.00
7	67.42	74.54	7	69.98	76.82	7	72.49	79.04
6	67.46	74.58	6	70.02	76.85	6	72.53	79.08
5	67.51	74.62	5	70.06	77.89	5	72.57	79.12
4	67.55	74.66	4	70.10	77.93	4	72.61	79.15
3	67.59	74.69	3	70.14	77.97	3	72.66	79.19
2	67.64	74.73	2	70.18	77.00	2	72.70	79.23
1	67.68	74.77	1	70.22	77.04	1	72.74	79.27
0	67.72	74.81	0	70.26	77.08	0	72.78	79.30
.8769	67.77	74.85	.8709	70.30	77.12	.8649	72.82	79.34
8	67.81	74.89	8	70.34	77.16	8	72.87	79.38
7	67.85	74.92	7	70.39	77.19	7	72.91	79.41
6	67.89	74.96	6	70.43	77.23	6	72.95	79.45
5	67.93	75.00	5	70.47	77.27	5	72.99	79.49
4	67.98	75.04	4	70.51	77.30	4	73.04	79.52
3	68.02	75.08	3	70.55	77.34	3	73.08	79.56
2	68.06	75.12	2	70.60	77.38	2	73.12	79.60
1	68.10	75.15	1	70.64	77.41	1	73.16	79.63
0	68.15	75.19	0	70.68	77.45	0	73.20	79.67
.8759	68.19	75.23	.8699	70.72	77.49	.8639	73.25	79.71
8	68.23	75.27	8	70.76	77.52	8	73.29	79.74
7	68.27	75.31	7	70.80	77.56	7	73.33	79.78
6	68.32	75.35	6	70.85	77.60	6	73.37	79.82
5	68.36	75.38	5	70.89	77.63	5	73.41	79.85
4	68.40	75.42	4	70.93	77.67	4	73.46	79.89
3	68.44	75.46	3	70.97	77.71	3	73.50	79.93
2	68.49	75.50	2	71.02	77.74	2	73.54	79.97
1	68.53	75.54	1	71.06	77.78	1	73.59	80.00
0	68.57	75.58	0	71.10	77.82	0	73.63	80.04
.8749	68.61	75.61	.8689	71.14	77.85	.8629	73.67	80.07
8	68.66	75.65	8	71.18	77.89	8	73.71	80.11
7	68.70	75.69	7	71.23	77.93	7	73.75	80.15
6	68.74	75.73	6	71.27	77.97	6	73.79	80.18
5	68.79	75.77	5	71.31	78.00	5	73.83	80.22
4	68.83	75.81	4	71.35	78.04	4	73.88	80.25
3	68.87	75.85	3	71.39	78.08	3	73.92	80.29
2	68.91	75.88	2	71.43	78.12	2	73.96	80.33
1	68.95	75.92	1	71.47	78.15	1	73.00	80.36
0	69.00	75.96	0	71.52	78.19	0	73.04	80.40
.8739	69.04	76.00	.8679	71.56	78.23	.8619	74.08	80.43
8	69.09	76.03	8	71.60	78.27	8	74.12	80.47
7	69.13	76.07	7	71.64	78.30	7	74.16	80.50
6	69.17	76.11	6	71.68	78.34	6	74.20	80.54
5	69.21	76.15	5	71.73	78.38	5	74.24	80.58
4	69.26	76.18	4	71.77	78.41	4	74.28	80.61
3	69.30	76.22	3	71.81	78.45	3	74.33	80.65
2	69.34	76.26	2	71.85	78.49	2	74.37	80.68
1	69.38	76.30	1	71.89	78.52	1	74.41	80.72
0	69.42	76.33	0	71.94	78.56	0	74.45	80.75

Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.	
	By Weight.	By Volume.		By Weight.	By Volume.		By Weight.	By Volume.
.8600	74.49	80.78	.8549	77.00	82.93	.8489	79.46	84.96
8	74.53	80.82	8	77.04	82.97	8	79.50	85.00
7	74.57	80.85	7	77.09	83.00	7	79.54	85.03
6	74.61	80.89	6	77.13	83.04	6	79.58	85.06
5	74.65	80.93	5	77.17	83.07	5	79.62	85.10
4	74.70	80.97	4	77.21	83.11	4	79.66	85.13
3	74.74	81.00	3	77.25	83.14	3	79.70	85.16
2	74.78	81.04	2	77.29	83.18	2	79.75	85.20
1	74.82	81.07	1	77.34	83.21	1	79.79	85.23
0	74.86	81.11	0	77.38	83.25	0	79.83	85.26
.8599	74.90	81.15	.8539	77.42	83.28	.8479	79.87	85.30
8	74.94	81.18	8	77.44	83.32	8	79.91	85.33
7	74.99	81.22	7	77.48	83.35	7	79.95	85.36
6	75.03	81.25	6	77.53	83.39	6	79.99	85.40
5	75.07	81.29	5	77.57	83.42	5	80.03	85.43
4	75.11	81.33	4	77.61	83.46	4	80.07	85.46
3	75.15	81.36	3	77.65	83.49	3	80.11	85.50
2	75.19	81.40	2	77.69	83.53	2	80.15	85.53
1	75.24	81.43	1	77.74	83.56	1	80.19	85.56
0	75.28	81.47	0	77.78	83.60	0	80.23	85.60
.8589	75.32	81.50	.8529	77.82	83.63	.8469	80.28	85.63
8	75.36	81.54	8	77.86	83.67	8	80.32	85.66
7	75.40	81.58	7	77.91	83.70	7	80.36	85.70
6	75.44	81.61	6	77.95	83.74	6	80.40	85.73
5	75.49	81.65	5	77.99	83.77	5	80.44	85.76
4	75.53	81.68	4	78.03	83.81	4	80.48	85.80
3	75.57	81.72	3	78.07	83.84	3	80.52	85.83
2	75.61	81.75	2	78.12	83.88	2	80.56	85.86
1	75.65	81.78	1	78.16	83.91	1	80.60	85.90
0	75.70	81.82	0	78.20	83.94	0	80.64	85.93
.8579	75.74	81.85	.8519	78.24	83.97	.8459	80.68	85.96
8	75.78	81.89	8	78.29	84.00	8	80.72	86.00
7	75.82	81.93	7	78.33	84.03	7	80.77	86.03
6	75.86	81.97	6	78.37	84.06	6	80.81	86.06
5	75.91	82.00	5	78.41	84.10	5	80.85	86.10
4	75.95	82.04	4	78.45	84.13	4	80.89	86.13
3	75.99	82.07	3	78.49	84.16	3	80.93	86.16
2	76.03	82.11	2	78.53	84.20	2	80.97	86.20
1	76.07	82.15	1	78.57	84.23	1	80.01	86.23
0	76.11	82.18	0	78.61	84.26	0	80.05	86.26
.8569	76.16	82.22	.8509	78.66	84.30	.8449	81.09	86.30
8	76.20	82.25	8	78.70	84.33	8	81.13	86.33
7	76.24	82.29	7	78.74	84.36	7	81.18	86.36
6	76.28	82.33	6	78.78	84.40	6	81.22	86.40
5	76.32	82.36	5	78.82	84.43	5	81.26	86.43
4	76.36	82.40	4	78.86	84.46	4	81.30	86.46
3	76.41	82.43	3	78.90	84.50	3	81.34	86.50
2	76.45	82.47	2	78.94	84.53	2	81.38	86.53
1	76.49	82.51	1	78.98	84.56	1	81.42	86.56
0	76.53	82.54	0	79.02	84.60	0	81.46	86.60
.8559	76.58	82.58	.8499	79.06	84.63	.8439	81.50	86.63
8	76.62	82.61	8	79.10	84.66	8	81.54	86.66
7	76.66	82.65	7	79.14	84.70	7	81.59	86.70
6	76.70	82.69	6	79.18	84.73	6	81.63	86.73
5	76.75	82.72	5	79.22	84.76	5	81.67	86.76
4	76.79	82.76	4	79.26	84.80	4	81.71	86.80
3	76.83	82.79	3	79.30	84.83	3	81.75	86.83
2	76.87	82.83	2	79.34	84.86	2	81.79	86.86
1	76.92	82.86	1	79.38	84.90	1	81.83	86.90
0	76.96	82.90	0	79.42	84.93	0	81.87	86.93

Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.	
	By Weight.	By Volume.		By Weight.	By Volume.		By Weight.	By Volume.
·8429	81·91	86·96	·8369	84·30	88·88	·8309	86·66	90·70
8	81·95	87·00	8	84·34	88·91	8	86·70	90·73
7	82·00	87·03	7	84·38	88·94	7	86·74	90·76
6	82·04	87·06	6	84·42	88·97	6	86·78	90·79
5	82·08	87·09	5	84·46	89·00	5	86·82	90·82
4	82·12	87·13	4	84·50	89·03	4	86·85	90·85
3	82·16	87·16	3	84·54	89·06	3	86·89	90·88
2	82·20	87·19	2	84·58	89·09	2	86·93	90·91
1	82·24	87·22	1	84·62	89·12	1	86·97	90·94
0	82·28	87·26	0	84·65	89·15	0	87·01	90·97
·8419	82·32	87·29	·8359	84·69	89·18	·8299	87·05	91·00
8	82·36	87·32	8	84·73	89·21	8	87·09	91·03
7	82·40	87·35	7	84·77	89·24	7	87·13	91·06
6	82·44	87·39	6	84·81	89·27	6	87·17	91·09
5	82·48	87·42	5	84·85	89·30	5	87·20	91·12
4	82·52	87·45	4	84·89	89·33	4	87·24	91·15
3	82·56	87·48	3	84·93	89·36	3	87·28	91·18
2	82·60	87·52	2	84·97	89·40	2	87·32	91·21
1	82·64	87·55	1	85·01	89·43	1	87·36	91·24
0	82·68	87·58	0	85·05	89·46	0	87·40	91·26
·8409	82·72	87·61	·8349	85·09	89·49	·8289	87·44	91·29
8	82·76	87·65	8	85·13	89·52	8	87·48	91·32
7	82·80	87·68	7	85·16	89·55	7	87·52	91·35
6	82·84	87·71	6	85·20	89·58	6	87·56	91·38
5	82·88	87·74	5	85·24	89·61	5	87·60	91·41
4	82·92	87·78	4	85·28	89·64	4	87·63	91·44
3	82·96	87·81	3	85·32	89·67	3	87·67	91·47
2	83·00	87·84	2	85·36	89·70	2	87·71	91·50
1	83·04	87·87	1	85·40	89·73	1	87·75	91·53
0	83·08	87·91	0	85·44	89·76	0	87·79	91·56
·8399	83·12	87·94	·8339	85·48	89·79	·8279	87·83	91·59
8	83·16	87·97	8	85·52	89·82	8	87·87	91·62
7	83·20	88·00	7	85·56	89·85	7	87·91	91·65
6	83·24	88·03	6	85·60	89·88	6	87·95	91·68
5	83·28	88·06	5	85·64	89·91	5	87·99	91·70
4	83·32	88·09	4	85·67	89·94	4	88·02	91·73
3	83·36	88·12	3	85·71	89·97	3	88·06	91·76
2	83·40	88·16	2	85·75	90·00	2	88·10	91·79
1	83·44	88·19	1	85·79	90·03	1	88·14	91·82
0	83·48	88·22	0	85·83	90·06	0	88·18	91·85
·8389	83·52	88·25	·8329	85·87	90·09	·8269	88·22	91·88
8	83·56	88·28	8	85·91	90·12	8	88·26	91·91
7	83·60	88·32	7	85·95	90·15	7	88·30	91·94
6	83·64	88·35	6	85·99	90·18	6	88·34	91·97
5	83·68	88·38	5	86·03	90·21	5	88·37	92·00
4	83·72	88·41	4	86·07	90·24	4	88·41	92·03
3	83·76	88·44	3	86·11	90·27	3	88·45	92·06
2	83·80	88·47	2	86·15	90·30	2	88·49	92·09
1	83·83	88·50	1	86·19	90·33	1	88·53	92·12
0	83·87	88·53	0	86·23	90·36	0	88·56	92·15
·8379	83·91	88·56	·8319	86·27	90·39	·8259	88·60	92·18
8	83·95	88·59	8	86·30	90·42	8	88·64	92·20
7	83·99	88·62	7	86·34	90·45	7	88·68	92·23
6	84·03	88·65	6	86·38	90·48	6	88·72	92·26
5	84·06	88·68	5	86·42	90·52	5	88·76	92·29
4	84·10	88·72	4	86·46	90·55	4	88·79	92·32
3	84·14	88·75	3	86·50	90·58	3	88·83	92·35
2	84·18	88·78	2	86·54	90·61	2	88·87	92·38
1	84·22	88·81	1	86·58	90·64	1	88·91	92·40
0	84·26	88·84	0	86·62	90·67	0	88·95	92·43



Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.	
	By Weight.	By Volume.		By Weight.	By Volume.		By Weight.	By Volume.
.8249	88.98	92.46	.8189	91.26	94.14	.8129	93.48	95.70
8	89.02	92.49	8	91.29	94.17	8	93.51	95.73
7	89.06	92.52	7	91.33	94.19	7	93.55	95.75
6	89.10	92.55	6	91.37	94.22	6	93.59	95.78
5	89.14	92.58	5	91.41	94.25	5	93.62	95.81
4	89.17	92.60	4	91.44	94.28	4	93.66	95.84
3	89.21	92.63	3	91.48	94.30	3	93.70	95.86
2	89.25	92.66	2	91.52	94.33	2	93.73	95.89
1	89.29	92.69	1	91.56	94.36	1	93.77	95.92
0	89.33	92.72	0	91.59	94.38	0	93.81	95.95
.8239	89.37	92.75	.8179	91.63	94.41	.8119	93.84	95.97
8	89.40	92.78	8	91.67	94.44	8	93.88	96.00
7	89.44	92.80	7	91.70	94.46	7	93.92	96.02
6	89.48	92.83	6	91.74	94.49	6	93.95	96.05
5	89.52	92.86	5	91.78	94.52	5	93.99	96.07
4	89.56	92.89	4	91.82	94.55	4	94.03	96.09
3	89.60	92.92	3	91.86	94.57	3	94.07	96.12
2	89.63	92.95	2	91.89	94.60	2	94.10	96.14
1	89.67	92.98	1	91.93	94.63	1	94.14	96.16
0	89.71	93.00	0	91.97	94.65	0	94.18	96.19
.8229	89.75	93.03	.8169	92.01	94.68	.8109	94.21	96.21
8	89.79	93.06	8	92.04	94.71	8	94.25	96.24
7	89.82	93.09	7	92.08	94.73	7	94.29	96.26
6	89.86	93.12	6	92.12	94.76	6	94.32	96.28
5	89.90	93.14	5	92.16	94.79	5	94.36	96.31
4	89.94	93.17	4	92.20	94.81	4	94.40	96.33
3	89.97	93.20	3	92.23	94.84	3	94.43	96.35
2	90.01	93.23	2	92.27	94.87	2	94.47	96.38
1	90.05	93.26	1	92.31	94.89	1	94.51	96.40
0	90.09	93.29	0	92.35	94.92	0	94.54	96.42
.8219	90.12	93.31	.8159	92.38	94.94	.8099	94.58	96.45
8	90.16	93.34	8	92.42	94.97	8	94.61	96.47
7	90.20	93.37	7	92.46	95.00	7	94.65	96.49
6	90.24	93.40	6	92.49	95.03	6	94.69	96.52
5	90.27	93.43	5	92.53	95.05	5	94.72	96.54
4	90.31	93.45	4	92.57	95.08	4	94.76	96.57
3	90.35	93.48	3	92.60	95.10	3	94.80	96.59
2	90.39	93.51	2	92.64	95.13	2	94.83	96.62
1	90.42	93.54	1	92.68	95.15	1	94.87	96.64
0	90.46	93.57	0	92.71	95.18	0	94.90	96.66
.8209	90.50	93.59	.8149	92.75	95.20	.8089	94.93	96.69
8	90.54	93.62	8	92.79	95.23	8	94.96	96.71
7	90.58	93.65	7	92.82	95.25	7	95.00	96.74
6	90.61	93.68	6	92.86	95.28	6	95.03	96.77
5	90.65	93.70	5	92.90	95.30	5	95.07	96.79
4	90.69	93.73	4	92.93	95.33	4	95.10	96.81
3	90.73	93.76	3	92.97	95.35	3	95.13	96.84
2	90.77	93.79	2	93.01	95.38	2	95.17	96.86
1	90.80	93.82	1	93.04	95.40	1	95.20	96.89
0	90.84	93.84	0	93.08	95.43	0	95.23	96.92
.8199	90.88	93.87	.8139	93.11	95.45	.8079	95.27	96.95
8	90.92	93.90	8	93.15	95.48	8	95.30	96.97
7	90.95	93.92	7	93.19	95.50	7	95.34	97.00
6	90.99	93.95	6	93.22	95.53	6	95.37	97.02
5	91.03	93.98	5	93.26	95.55	5	95.41	97.04
4	91.07	94.00	4	93.30	95.58	4	95.44	97.07
3	91.11	94.03	3	93.33	95.60	3	95.48	97.09
2	91.14	94.06	2	93.37	95.63	2	95.51	97.11
1	91.18	94.09	1	93.41	95.65	1	95.55	97.14
0	91.22	94.11	0	93.44	95.68	0	95.58	97.16

Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.		Specific Gravity at 60°F.	Absolute Alcohol, per cent.	
	By Weight.	By Volume.		By Weight.	By Volume.		By Weight.	By Volume.
.8069	95.62	97.18	.8019	97.34	98.33	.7969	99.02	99.39
8	95.65	97.21	8	97.37	98.35	8	99.05	99.41
7	95.68	97.23	7	97.40	98.37	7	99.08	99.43
6	95.72	97.25	6	97.44	98.39	6	99.12	99.45
5	95.75	97.28	5	97.47	98.41	5	99.15	99.47
4	95.79	97.30	4	97.50	98.44	4	99.18	99.49
3	95.82	97.32	3	97.54	98.46	3	99.22	99.52
2	95.86	97.35	2	97.57	98.48	2	99.25	99.54
1	95.89	97.37	1	97.61	98.50	1	99.29	99.56
0	95.93	97.39	0	97.64	98.52	0	99.32	99.58
.8059	95.96	97.42	.8009	97.68	98.55	.7959	99.35	99.60
8	96.00	97.44	8	97.71	98.57	8	99.39	99.62
7	96.03	97.46	7	97.75	98.59	7	99.42	99.64
6	96.07	97.49	6	97.78	98.61	6	99.46	99.66
5	96.10	97.51	5	97.81	98.63	5	99.49	99.68
4	96.14	97.53	4	97.85	98.66	4	99.52	99.70
3	96.17	97.56	3	97.88	98.68	3	99.56	99.72
2	96.21	97.58	2	97.91	98.70	2	99.59	99.74
1	96.24	97.60	1	97.95	98.72	1	99.63	99.76
0	96.28	97.63	0	97.98	98.74	0	99.66	99.78
.8049	96.31	97.65	.7999	98.02	98.77	.7949	99.69	99.80
8	96.35	97.67	8	98.05	98.79	8	99.73	99.82
7	96.38	97.70	7	98.08	98.81	7	99.76	99.84
6	96.42	97.72	6	98.12	98.83	6	99.79	99.86
5	96.45	97.74	5	98.15	98.85	5	99.82	99.88
4	96.49	97.77	4	98.18	98.88	4	99.85	99.90
3	96.52	97.79	3	98.22	98.90	3	99.88	99.92
2	96.56	97.81	2	98.25	98.92	2	99.91	99.94
1	96.59	97.84	1	98.28	98.94	1	99.94	99.96
0	96.63	97.86	0	98.32	98.96	0	99.97	99.98
.8039	96.66	97.88	.7989	98.35	98.98	.7939	100.00	100.00
8	96.70	97.91	8	98.39	99.00			
7	96.73	97.93	7	98.42	99.02			
6	96.77	97.95	6	98.45	99.04			
5	96.80	97.98	5	98.48	99.06			
4	96.84	98.00	4	98.52	99.08			
3	96.87	98.02	3	98.55	99.10			
2	96.90	98.04	2	98.58	99.12			
1	96.94	98.06	1	98.62	99.14			
0	96.97	98.08	0	98.65	99.16			
.8029	97.00	98.11	.7979	98.68	99.18			
8	97.04	98.13	8	98.71	99.20			
7	97.07	98.16	7	98.75	99.22			
6	97.10	98.18	6	98.78	99.24			
5	97.14	98.20	5	98.81	99.27			
4	97.17	98.22	4	98.85	99.29			
3	97.20	98.24	3	98.88	99.31			
2	97.23	98.26	2	98.91	99.33			
1	97.27	98.28	1	98.95	99.35			
0	97.30	98.30	0	98.98	99.37			

**An Antidote to Strychnia.**—From some observations of Professor Cervello ("Arch. Scie. Med., vol. ii, No. 1), it seems that paraldehyd possesses properties antagonistic to strychnia. Thirty-seven and a half grains of the former completely antagonized  $\frac{1}{15}$  of a grain of nitrate of strychnia given to a rabbit. The converse action does not seem to exist, for strychnia has no influence on paraldehyd narcosis.—*Med. and Surg. Reporter.*

## THE STEAROPTEN OF OIL OF PATCHOULY.

BY HENRY C. C. MAISCH.

*Read at the Pharmaceutical Meeting, January 15, 1884.*

Patchouly camphor, a homologue of borneol, as obtained from the oil is in pieces of various size and form, mostly belonging to the hexagonal class of crystals. The color ranged from light yellow, probably from adhering or enclosed oil, to colorless.

In order to purify the camphor, it was dissolved in alcohol. This solution did not crystallize although evaporated to a syrupy consistency. The alcohol was completely driven off, and the residue dissolved in ether, from which solution it deposited after several times recrystallizing in colorless truncated hexagonal prismatic crystals.

The fusing points of both the crude and the recrystallized camphor were determined. A small quantity was put on some mercury in a beaker glass in which a thermometer was suspended, the mercury covering the bulb. A slow heat was then applied, the mercury in the thermometer rising slowly. The melting point of the recrystallized camphor was found between  $55^{\circ}$  and  $56^{\circ}\text{C.}$ , coming near that determined by Gal in 1869 (*"Compt. Rend.,"* lxxviii, 406), who gives it as  $54\text{--}55^{\circ}\text{C.}$ , while another author, de Montgolfier (*"Ber. Deutsch. Chem. Ges.,"* 1877, 374), gives it as  $59^{\circ}\text{C.}$  The melting point of the crude camphor, determined upon mercury as stated above, was found between  $57\text{--}58^{\circ}\text{C.}$ , or about  $2^{\circ}\text{C.}$  higher than that of the recrystallized. The latter again solidified when cooled to between  $48^{\circ}$  and  $49^{\circ}\text{C.}$ , but the congealing point for the crude camphor is between  $54^{\circ}$  and  $55^{\circ}\text{C.}$  The boiling point determined by Gal, is given at  $296^{\circ}\text{C.}$ , the specific gravity as 1.051 at  $4.5^{\circ}\text{C.}$ , and the vapor density as 8.00 at  $324^{\circ}\text{C.}$

Both authors above mentioned, have determined the formula, Gal giving it as  $\text{C}_{15}\text{H}_{23}\text{O}$ , and de Montgolfier  $\text{C}_{15}\text{H}_{26}\text{O}$ . Further experiments have shown that in the solid state the camphor has no effect on the plane of polarization while in liquid state it is levorotatory. By distillation over zinc chloride and by the action of anhydrous hydrochloric acid, boiling acetic acid and acetic anhydride one molecule of water is set free giving  $\text{C}_{15}\text{H}_{24}$  or  $\text{C}_{15}\text{H}_{26}$  respectively, a liquid hydrocarbon, which boils at about  $250^{\circ}\text{C.}$ , and at a slightly higher temperature is converted into polymeric hydrocarbons. Gal also found the oil left after the crystallization of the camphor, to distil over almost

completely at 282°–294°C. to have the same composition and to yield the same products as the camphor. In 1863 J. H. Gladstone ("Jour. Chem. Soc.") ascertained the rotation of different samples of the oil of patchouly to vary between 0 and—120°.

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## OLEUM BETULÆ LENTÆ.

BY GEO. W. KENNEDY, PH.G.

*Read at the Pharmaceutical Meeting, January 15, 1884.*

In a paper on this subject, read at the last meeting of the American Pharmaceutical Association, I stated that I had considerable correspondence with distillers in reference to the manner of extracting the oil and to the details of the process. After the analysis made by Mr. Pettigrew ("Amer. Jour. Phar.," 1883, page 385), in which he failed to find a terpene in oil of birch, and maintained that on this account it was not identical with oil of teaberry, Prof. Maisch suggested to me in conversation that perhaps the hydrocarbon was lost in the distillation of commercial oil of teaberry either by carelessness or through ignorance of the distiller, or by some defect in the process of extracting it. I immediately put myself in communication with several manufacturers for the sole purpose of ascertaining from them full particulars, more particularly as to the separation of a light oil floating on the surface of the distillate. The replies to these communications, excepting one or two, were alike. To the first interrogation, as to the process of extracting the oil, I find the *modus operandi* to be very much the same; there is little or no difference. To the second inquiry, as to the separation of a light oil, with one or two exceptions I was informed that this was of frequent occurrence, had been noticed by them for a long time, and was known in the birch fields by the names of "light ring" and "light oil." I was also informed that no care was taken to secure it, as it was considered worthless, of no value whatever, and that it was allowed to run off over the receiving vessel (see "Amer. Jour. Phar.," 1882, page 49).

After such strong proof from the distillers, and similar assurance from two reliable pharmacists, who handle hundreds of pounds of the oil, with whom I was in communication, I came to the conclusion that—provided the oil was properly and carefully extracted—it would



contain a hydrocarbon, and it was owing to this strong evidence that, at the Washington meeting, I unhesitatingly said that there was no reason why the oil should not contain the terpene. I believe, under the circumstances, I was justified in so speaking. The interesting discussion which followed the reading of my paper threw out suggestions which caused me to make further investigations.

It was my intention to spend several days in the birch woods, as I had invitations extended to do so, and witness the process of distillation more critically than I did on former occasions, but I was unable to fix a time to suit the convenience of all parties interested, owing to the small amount of oil made. During the past few months the stills were not in operation, the price of the oil being too low to compensate the distillers for their labor. However, my friend Mr. C. M. Briggs, a pharmacist of Carbon county, to whom I am much indebted for many favors, spent a day at one of the best stills in the region, which is worked by a man who thoroughly understands his business, and he obtained for me the product of the distillation of 600 pounds of material, which I here exhibit. The large jar (Mason's fruit jar) contains the oil just as it was made, with some water and dirt. Owing to an accident, about six ounces of the oil were lost. The yield was about one pound, or one-sixth of one per cent., which was small. The amount of "milk" (or water impregnated with oil), condensed in the exhaustion of the bark, amounts to 30 gallons. The jar was used as the receptacle for the oil, and was placed in a pail; as the pail fills with the "milk" it is emptied into a barrel, and put away to be used for another "run," as it is called, meaning the next distillation. The bottle labeled milk is a sample of the product nearing the close of the distillation. When received it was quite milky, but now the oil has separated, and of course the milkiessness has disappeared, but by agitation it can be restored; the oily globules of a dirty color can be seen at the bottom of the vial. The "milk" contains about 2 ounces of the oil in every 25 gallons. The pieces of birch exhibited have had the oil taken out, and will give an idea as to the size of the pieces used in the extraction of the oil.

There was also another bottle received by the writer, marked "unknown," and said to contain "light oil," or "light ring," exclusively, and which, from previous information received, was considered to be a hydrocarbon. The vial contained  $4\frac{1}{2}$  fluidounces, which was reported to me as having been skimmed from five pounds of oil before

it was rectified, or just as it came from the still; it was in two layers, and decidedly dirty, the layers occupying about an equal space in the bottle. After freeing it from dirt, by straining through flannel, the layers were separated, and upon examination the light upper layer was found to be nothing but water impregnated with oil. Its specific gravity at 70°F. is 1.001. The lower layer proved to be the oil, the specific gravity of which was taken, and found to be the same as that examined last year, 1.181 at 70°F., thus indicating that it was principally methyl salicylate. This oil was next submitted to a chemical analysis in the same manner as described by Mr. Pettigrew: 50 grams of the oil were decomposed with 25 grams of potassium hydrate, by boiling for six hours upon a sand-bath; at the expiration of this time the oil was perfectly decomposed, and, upon cooling, crystals of salicylate of potassium were obtained, and a clear distillate, without oily layer, nor was such produced upon dilution with water. This observation manifested conclusively the absence of a hydrocarbon. To get at the percentage of salicylic acid and methyl alcohol was the next step taken. The salicylate of potassium, formed as indicated above, was decomposed by hydrochloric acid, which liberated the salicylic acid in small whitish crystals, requiring only to be drained and subsequently recrystallized from ether. The amount obtained from 50 grams of the oil was 40 grams, or about 80 per cent. Another bottle, presented herewith and marked "impure," contains the acid as it is set free from the potassium salt. This was obtained from an old oil, made last year, and has not been recrystallized.

I then proceeded to obtain the methyl alcohol from the oil decomposed as described; the liquid portion was distilled from a sand-bath, until one-fourth the entire amount had passed over; this was redistilled, obtaining one-fourth as before, and this product, to get rid of the water, was distilled twice from lime. The methyl alcohol thus obtained, which is also shown, approximates  $8\frac{1}{2}$  grams, or 17 per cent. This added to the acid yield would still leave a discrepancy of 3 per cent. to be accounted for.

The rectification (as it is termed) of the oil, to which I referred a year ago, is accomplished by simply straining or filtering through cotton and flannel.

The yield, as I have already stated, from the distillation made Dec. 26, 1884, was small; it required  $7\frac{1}{2}$  hours' time to make the pound obtained. In the spring, when the sap is in the trees, the yield is from

25 to 35 per cent. larger, and the time consumed one to two hours less.

In concluding this paper I would state that I have endeavored to get all the information it was possible for me to obtain; also, that if all the "light oil" or "light ring" is like that examined by me, there should be no difficulty in giving it a name. The two samples of oil examined, of which one was a year and the other but a few days old, contained no terpene, and the result agrees with Mr. Pettigrew's observation, that oil of birch is nearly pure salicylate of methyl. The "light oil," so called by distillers, is shown to be water and oil; if the chips and dirt were removed from the distillate the oil and water would readily separate.

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## NOTES ON THE EXPANSION OF URINE BY INCREASE OF TEMPERATURE.

BY A. B. LYONS, M.D., Detroit, Mich.

In order that an observation of the specific gravity of urine shall be of any value, either the experiment must be made always at the same temperature, or else, the actual temperature being noted, an arbitrary correction must be applied. In clinical practice the first alternative involves difficulties not easily surmounted, and most physicians would prefer to adopt the second. Unfortunately, however, their textbooks are either silent altogether as regards the amount of the correction, or else the positive statements made by one authority contradict those of another. Thus Neubauer and Vogel state that according to the observations of Siemon the specific gravity of a urine which at 12°C. was 1.021, at 15°C. sank to 1.020, and at 18°C. to 1.019, so that a difference of temperature of 3°C. corresponds to about one degree of the urinometer. Beneke, they add, arrived at the same results. Witthaus probably quotes the same authority when he says (*Manual of Chemistry*, p. 5): "In a complex fluid like the urine a correction for temperature can be made roughly by allowing 1° of specific gravity for each 3°C. (5.4° Fahr.) of variation in temperature." Dr. Squibb, in the September "*Ephemeris*," makes a similar statement. Dr. Golding Bird, on the other hand, makes a correction of only about one-half this amount, *i. e.*, between 60° and 71°F., of one degree of the urinometer, and between 71° and 81°, of the same

amount. In view of these discrepancies, and of the improbability that the correction should be so large as stated by Neubauer and Vogel, I thought it worth the while to make an experimental test of the matter, and I have embodied the results of my observations in the accompanying tables. The figures represent the apparent specific gravities, as taken with an instrument adjusted to a temperature of 60°F., the unit of comparison being water at that temperature. For practical purposes the correction should be deduced from apparent and not actual specific gravities; otherwise there will be not one but several corrections to be applied to the figures obtained by observation.

TABLE I.—*Apparent Specific Gravity of Urine observed at Temperatures from 50° to 95° F., Water at 60° F. = 1·0000.*

Temperature. Fahr.	Specimen, No. 1.	Specimen, No. 2.	Specimen, No. 3.	Specimen, No. 4.	Specimen, No. 5.	Specimen, No. 6.
50°.....				1·02315		1·02495
55°.....	1·01305	1·02075	1·0223	1·0226	1·0230	1·0235
60°.....	1·0124	1·0203	1·02175	1·0221	1·0226	1·02295
65°.....	1·0119	1·0198	1·0212	1·0215	1·0221	1·02235
70°.....	1·0114	1·01915	1·0204	1·0209	1·0215	1·02155
75°.....	1·01075	1·01845	1·0197	1·02025	1·0208	1·02085
80°.....	1·0101	1·0177	1·0190	1·0195	1·0201	1·0201
85°.....	1·0094	1·01685	1·0181	1·0187	1·0194	1·0193
90°.....	1·0087	1·0160	1·0172	1·0179	1·0186	1·0184
95°.....	1·0080	1·01515	1·0162			

Temperature. Fahr.	Specimen, No. 7.	Specimen, No. 8.	Total correction (average).	Average correction for 1°F.	Solution of common salt.	Distilled water (apparent)
50°.....	1·0267	1·0285	—·00105	·000105	1·0630	1·00050
55°.....	1·0261	1·02745	—·00054	·000108	1·0625	1·00026
60°.....	1·0255	1·02695	+·00000		1·06192	1·00000
65°.....	1·0249	1·02645	+·00057	·000114	1·0612	·99956
70°.....	1·0242	1·0258	+·00122	·000122	1·0604	·99912
75°.....	1·0235	1·0251	+·00190	·000127	1·05955	·99861
80°.....	1·0228	1·0244	+·00263	·000131	1·0586	·99797
85°.....	1·0221	1·0236	+·00342	·000137	1·05765	·99732
90°.....	1·0214	1·0227	+·00424	·000141	1·05665	·99657
95°.....	1·0206	1·0218	+·00509	·000145		·99476



TABLE II.—*Apparent Specific Gravity of Urine observed at Temperatures from 10° to 35° C., Water at 15° C. = 1·0000.*

Temperature. Cent.	Sample, No. 1.	Sample, No. 2.	Sample, No. 3.	Sample, No. 4.	Sample, No. 5.	Sample, No. 6.
10°.....	1·0299	1·0280	1·0267	1·0231	1·0235	1·0212
15°.....	1·0290	1·0271	1·0256	1·02215	1·0227	1·0203
20°.....	1·02175	1·0260	1·0245	1·02115	1·02185	1·01935
25°.....	1·0205	1·02485	1·0233	1·0200	1·02055	1·01815
30°.....	1·0189	1·0234	1·0220	1·0186	1·0192	1·01675
35°.....	1·0170	1·0218	1·0206	1·01715	1·0177	1·01525

Tem- perature. Cent.	Sample, No. 7.	Sample, No. 8.	Sample, No. 9.	Total correction (average).	Average correction for 1° C.	Sp. gr. of solution of common salt.	Sp. gr. (apparent) of water.
10°.....				—·00092	·000185	1·0630	1·00058
15°.....	1·0205	1·0212	1·01255	·00000		1·0620	1·00000
20°.....	1·0195	1·0207	1·0116	+·00101	·000202	1·06065	·99938
25°.....	1·0184	1·0194	1·01065	+·00220	·000220	1·0592	·99837
30°.....	1·0171	1·0180	1·0094	+·00358	·000239	1·0575	·99713
35°.....	1·0156	1·0162	1·0080	+·00514	·000257	1·0558	·99566

A study of the above figures will show that Neubauer and Vogel have given too large a correction, while Golding Bird has given one too small. As might be expected, different specimens of urine show different expansion, even when the density is about the same, and the variation is curiously capricious, sometimes being greater between 50° and 60° than between 60° and 70°F. On the whole, however, the expansion becomes more rapid as the temperature rises, so that a larger arbitrary correction should be made for temperatures above 77°F. than for those below that figure.

An average correction sufficiently exact for practical purposes would be for temperatures below 75°F. one degree of the scale of the urinometer (=·001) for 8½°F., or nearly 5°C.; for temperatures above this, one degree of the urinometer for 7¼°F., or about 4°C.

Thus, if the temperature is 70°F., and the reading of the urinometer 1·022, the correction for 10° will be  $10 \div 8\frac{1}{2} = \cdot0012$  nearly, and the corrected specific gravity will be  $1\cdot022 + \cdot0012 = 1\cdot0232$ .

If at  $85^{\circ}$  the reading of the urinometer be 1.019, a correction must be made for  $25^{\circ}\text{F.}$ , which will be  $25 \div 7.25$ , or about .0035, and the corrected specific gravity will be 1.0225.

From the tables more exact figures may be obtained, but different specimens vary so greatly that when great exactness is required the specific gravity should be taken at the standard temperature.

It is possible that peculiarities in the diet and the habits of different individuals and of different nationalities may produce constant differences in the physical characteristics of the urine as affected by temperature, and it is to be hoped that other observers will make a study of this matter, and report results for comparison. The figures obtained in my own observations agree very well with what we might expect from the composition of the fluid under consideration. I have added to the table, for comparison, the specific gravities respectively of pure water and of a solution of common salt, taken at the same temperatures as the specimens of urine. It will be observed that both the saline fluids expand much more rapidly, especially at the lower temperatures, than pure water.

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## ON THE ACTION OF AMMONIUM CHLORIDE UPON LEAD IODIDE.

BY HENRY C. C. MAISCH.

*Read at the Pharmaceutical Meeting, January 15, 1884.*

The Pharmacopœia of 1880 gives as a test for the purity of lead iodide the following: "On triturating 1 part of the salt with 2 parts of chloride of ammonium in a porcelain mortar, and adding 2 parts of water, a colorless liquid should result (absence of and difference from chromate)."

This would give a solution of 3 parts of the mixed salts in 2 parts of water. On looking for the solubilities I find the Pharmacopœia to give for lead iodide 1 part in 2,000 parts at  $15^{\circ}\text{C.}$  ( $59^{\circ}\text{F.}$ ) and in 200 parts of boiling water, and for ammonium chloride 1 part in 3 parts at  $15^{\circ}\text{C.}$ , and in 1.37 parts of boiling water. The combination of the salts would form, according to the pharmacopœial test, a compound soluble in 0.67 parts of cold water, or of about the same solubility as the deliquescent salts sodium iodide and potassium hypo-

phosphite, and more freely soluble than the deliquescent potassium carbonate.

The test of the Pharmacopœia was evidently copied from "Hager's Pharmaceutische Praxis," vol. 2, p. 741, but not without making a mistake in its rendition. A proper version from Hager follows: "If 1 part of lead iodide be triturated in a porcelain mortar with 2 parts of ammonium chloride, and 2 parts of water are added, decoloration must soon follow; otherwise the salt may possibly contain lead chromate."

If 2 grams of lead iodide be triturated in a mortar with 4 grams of ammonium chloride, transferred to a test tube, and 4 grams of water are added, a magma of a white or whitish color entirely free from any yellow tint, results, but not a solution, as stated by the Pharmacopœia. If heat be now applied the golden yellow color of lead iodide again makes its appearance and changes, on further application of heat, to a pale yellow or yellowish white before dissolving. This solution is of a brownish yellow color and deposits lemon-yellow ramifying crystals; if allowed to cool slowly, these are soon covered by pale yellow or white silky, fine, acicular crystals; but if rapidly cooled the latter crystals only form.

If to another mixture of the two salts in the same proportion with the same amount of water as above, 4 parts more of water are added, the golden yellow color of lead iodide makes its appearance at the point of contact. On heating this mixture to boiling the color changes to a greenish yellow, and before dissolving to a yellowish white as in the first experiment. On cooling, this solution deposits lemon colored crystals as in the other solution, which are soon covered by the white silky crystals as in the other solution. In both cases solution is not effected in the cold but only on heating.

If, as a third experiment, a small quantity of lead chromate is added to lead iodide, and the salt is then triturated with 2 parts of ammonium chloride and with 2 parts of water, the mixture becomes somewhat lighter in color. Now, on heating, this mixture only partly dissolves, leaving a brick-red precipitate with a brownish yellow solution. On cooling, crystals of a white color are formed on top of the precipitate.

Thinking it would be of interest to know something about the reactions which take place in the foregoing experiments, I looked through the literature on the subject. In Gmelin's *Inorganic Chemis-*

try four compounds are noticed which may be formed and the following information is given as to their formation, composition and properties :

Lead iodide is completely soluble in both hot and cold solutions of ammonium chloride. The hot solution on cooling deposits crystals having the formula  $\text{NH}_4\text{Cl} \cdot \text{PbI}_2$  (Völekel) and  $(\text{NH}_4\text{Cl})_3 \cdot (\text{PbI}_2)$  ("Behrens, Pogg. Ann." lxii, 252). The first are described as yellowish white needles, the second as yellowish needles, having a beautiful silky lustre. The yellow acicular crystals, which are deposited from the hot solution, according to Poggiale, do not contain any ammonium chloride and have the formula  $(\text{PbCl}_2)_2 \cdot \text{PbI}_2$ . After concentration the mother liquor deposits white branching needles of a silky lustre, which contain ammonium chloride, become yellow on exposure to air, and are decomposed by water; their formula is  $(\text{NH}_4\text{Cl})_4 \cdot \text{PbI}_2 \cdot 2\text{H}_2\text{O}$  ("Poggiale, Compt. Rend." xx, 1180.)

On applying the test as proposed by Hager and admitted by the Pharmacopœia, the change of the mixture in color from yellow to white is most likely due to the formation of lead chloride and ammonium iodide, both of which salts are white; possibly a double chloride may be formed, or a white double salt containing both iodide and chloride. On the application of heat the lead iodide is reproduced before it is dissolved with the formation of one or more of the above-mentioned double salts. A reproduction of lead iodide, either wholly or in part, also takes place on diluting the mixture with cold water.

The solubility of lead iodide in ammonium chloride was already observed in 1827 by Boullay ("Ann. Chim. Phys.," xxxiv). But Wittstein appears to have first studied the effect of ammonia and its salts upon lead iodide ("Buchner's Report.," 1838, liii, 322); he found that solutions of ammonium carbonate and sulphate change the yellow color of lead iodide rapidly to white, and that the same change though less rapidly, also takes place with ammonia and with ammonium nitrate and succinate. Very likely all freely soluble ammonium salts have the same effect.

The influence of ammonium salts upon lead chromate does not appear to have been the subject of investigation; at least I have found nothing in works of reference beyond the statement that chrome yellow is insoluble in ammonium chloride. This, as shown above, is correct; yet a notable change takes place on boiling with a solution of the latter salt, indicating the production of basic lead chromate or chrome red.

Before summing up I would like to call attention to a misplacement



in the table of solubilities of the Pharmacopœia (page 426) under the head of ammonium chloride; at present it reads: 1 part soluble in 3 parts of water at 15°C. ; almost insoluble in boiling water; soluble in 1.37 parts alcohol at 15°C. ; almost insoluble in boiling alcohol. In order to make it conform to the text under ammonium chloride it should read, 1 part soluble in 1.37 parts of boiling water, and almost insoluble in alcohol at 15°C.

The test of the Pharmacopœia for the absence of lead chromate from lead iodide should read about as follows: "On triturating 1 part of the salt (lead iodide) with 2 parts of chloride of ammonium in a porcelain mortar and adding 2 parts of water, the mixture should soon change to a white color and when heated should dissolve without residue."

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## THE PREPARATION OF PURE BENZOIC ACID FROM URINE.<sup>1</sup>

BY T. S. DYMOND.

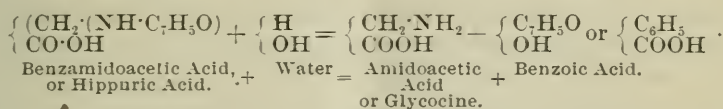
*Contribution from the Research Fund of the School of Pharmacy Students' Association.*

In the production of some glycoeine from hippuric acid, for the confirmation of the reported synthesis of uric acid, the results of which investigation I partly brought before this Association last year, I obtained as a bye-product, benzoic acid. The preparation of benzoic acid in this way is interesting, because it is indirectly obtained from urine, hippuric acid being derived from that source, and because the use of such benzoic acid, which, as hitherto prepared, retains the odor of urine, is prohibited by British, German and United States Pharmacopœias. This being the case, I have made a few experiments to determine in what way benzoic acid thus obtained differs from that obtained from gum benzoin.

*Preparation.*—The commercial method of preparing benzoic acid from urine is by boiling putrid urine (which contains the hippuric acid in solution) with hydrochloric acid. A purer body will obviously be obtained at little more expense by first separating the hippuric acid, and this now is frequently done commercially. The phosphates in the urine taken are precipitated by lime. The urine is neutralized with hydrochloric acid, and evaporated to a low bulk. Strong hydrochloric

<sup>1</sup> Read at a meeting of the School of Pharmacy Students' Association, November 29, 1883.

acid is then added in excess, and the hippuric acid which separates is washed and recrystallized and sometimes further purified and decolorized. The purified hippuric acid is then heated with strong hydrochloric acid and the mixture kept at its boiling point till the hippuric acid has entirely disappeared and dark oily drops of benzoic acid have begun to form. On cooling and adding water the benzoic acid crystallizes out in the form of flattened plates, which are washed and dried.



Benzoic acid thus obtained has that peculiar urine-like odor which quite unfits it for use in medicine.

I have found, however, that when this impure acid is carefully sublimed, it can be obtained in a state of perfect purity and in beautiful crystals, which recrystallize from water in a form different from that in which the acid crystallizes before sublimation, but identical with that in which benzoic acid obtained from gum crystallizes.

*Tests.*—The only test in the British Pharmacopœia for benzoic acid is that of smell; benzoic acid is to have an agreeable aromatic odor resembling that of benzoin. As gum benzoin differs very much in smell, some specimens containing styrol, and others vanillin, while others have no particular odor, as the specimen of Palembang gum from the Museum of the Pharmaceutical Society, there is much commercial benzoic acid which does not answer to this test, and has not the aroma which it is understood gum benzoin should have.

In the German Pharmacopœia there are three tests. The acid is to have the smell of benzoin and also an empyreumatic odor, and is to be of a yellowish or yellow-brown color. This is to ensure the acid being prepared by direct sublimation of the gum. However, benzoic acid thus made, if the operation be performed with care and at a low temperature, may be quite colorless. It is a pity that the acid should be required to be contaminated, simply to prevent adulteration with acid obtained from other sources. In order to obtain it colorless a temperature of 160° C. is quite high enough for the sublimation of the whole of the acid. At first water and dark colored hydrocarbons volatilize together with some benzoic acid; these must be allowed to escape for two or three hours. The benzoic acid may then be collected,

a free outlet being always allowed for the less readily condensable vapors.

Before the end of the operation all these vapors will have passed away and the temperature may be raised even to 230° C. without any risk of contaminating the acid.

The second test is to prove the absence of cinnamic acid, and depends on the fact that the odor of oil of bitter almonds is evolved when cinnamic acid is warmed with an oxidizing agent. It is difficult to get benzoic acid, which has been sublimed directly from gum, always free from cinnamic acid; for all varieties of benzoin occasionally contain this acid, and sometimes it has been said no benzoic acid ('Pharmacographia'); and it is only by the lime extraction method that the cinnamic acid could be got rid of, as it sublimes in the same way as benzoic acid.

The third test is to prove the presence of volatile hydrocarbons, and depends on the fact that known quantities of styrol and vanillin and some other liquid hydrocarbons reduce a known quantity of solution of permanganate of potassium in a certain time. This test is also faulty, for if a few drops of permanganate solution be added to a crystallized solution of the impure urine-benzoic acid, decolorization occurs in a very short time, although no styrol or other aromatic hydrocarbon is present. Almost any organic matter, indeed, will effect this change.

The United States Pharmacopœia implies that benzoic acid must be made from benzoin by extraction with lime, for the acid is to be white and to have only a faint aromatic odor of benzoin. It is not to have the smell of oil of bitter almonds or stale urine, thus preventing the use of benzoic acid prepared from toluene or from urine.

Two additional tests are given.

1. A solution of benzoic acid in pure cold sulphuric acid, when gently warmed, should not turn darker than a light brown. This is a good test for the absence of organic impurity.

2. Benzoic acid mixed with freshly ignited and moistened cupric oxide should not yield a green coloration to the flame when applied on a platinum wire. This test is meant to prove the absence of chlorobenzoic acid, which may occur as an impurity if the benzoic has been made from toluene. It must be performed with great care, for if the mixture be allowed to get too hot, the cupric oxide combines with the benzoic acid, and colors the flame an intense green. The mass then

must be kept moist. It will be seen from these tests that all the Pharmacopœias require that benzoic acid must be prepared from gum benzoin. The German Pharmacopœia directs that it is to be made by sublimation, have a yellowish-brown color, aromatic odor, and contain a substance (styrol?) capable of reducing potassium permanganate. Hence the benzoic acid of the German Pharmacopœia is not intended to be chemically pure. The United States Pharmacopœia indicates that it should be prepared by the lime method and be chemically pure. Urine-benzoic acid can never answer to the tests for the former, but when prepared by the method above described, it will be seen that it comes up to the standard imposed by the tests for the latter.

The following table shows how five specimens of benzoic acid compare with each other :

	Urine benzoic acid unsublimed.	Urine benzoic acid sublimed.	Benzoic acid extracted with lime from Palembang gum.	A commercial specimen of benzoic acid.	Benzoic acid sublimed from Palembang gum.
Solution in cold $H_2SO_4$ when warmed is....	Dark brown	Light brown	Light brown	Light brown	Dark brown.
Mixed with moist CuO gives in the flame. ....	No green tinge.	No green tinge.	No green tinge.	No green tinge.	No green tinge.
Warmed with solution of $K_2Mn_2O_8$ gives.....	No odor.	No odor.	No odor.	No odor.	Smell of oil of bitter almonds.
A cold solution with $K_2Mn_2O_8$ becomes...	Colorless in 5 minutes.	Not colorless in 12 hours.	Not colorless in 12 hours.	Not colorless in 12 hours.	Colorless in 5 minutes.
Crystallizes from an aqueous solution in	Prismatic needles.	Flaky crystals.	Flaky crystals.	Flaky crystals.	Small needles
Odor .....	Like urine.	Faintly aromatic.	Faintly aromatic.	Disagreeably aromatic.	Strongly aromatic.

It would appear then that benzoic acid prepared from hippuric acid is totally unfit for use in medicine, unless it has been sublimed. When sublimed its character is entirely changed. Instead of crystallizing from water in large prisms, it does so in flaky crystals like the natural varieties. It has lost its offensive smell and has even a faint aromatic odor. It is purer than the acid obtained by direct sublimation of the gum, for it does not contain any volatile hydrocarbons, and solution of



permanganate of potassium was only decolorized after long standing. It is pure benzoic acid and is identical with the specimen of acid extracted by lime from Palembang benzoin.

From these experiments it will also be seen that the absence of urine-like odor in a sample of benzoic acid, and its conformity to the United States Pharmacopœia tests cannot be taken as indicating that it has not been prepared from urine.

My thanks are due to Mr. Holmes for the assistance he has given me in the identification of the resins, and to Mr. Dunstan for his suggestions and help while working in the Laboratories of the Pharmaceutical Society.—*Phar. Jour. and Trans.*, Dec. 15, 1883.

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## THE PREPARATION OF QUASSIIN.<sup>1</sup>

BY ADRIAN AND MOREAUX.

Quassiin, the active principle of *Quassia amara* or Surinam wood, has long been presented in a more or less impure extractive form. The authors have studied the different published methods of extraction and have arrived at the conclusion that some of these methods give but a defective product, while the others, though producing purer quassiin, remove but a small portion of the bitter principle contained in the wood.

After quoting the methods for extraction given by Soubeiran, Pelouze, Wurtz, Wiggers, and Christiansen, the authors state that by the following process, which is their own, a purer and more abundant product is obtained.

Very sound wood reduced to thin shavings is exhausted by the aid of boiling distilled water, either by displacement or by decoction, carbonate of potash being added to the extent of 5 grams per kilogram of quassia. The liquor is then concentrated by evaporation, first by the open fire, afterwards in a water-bath, to the consistence of a soft extract; a mean of 60 grams per kilogram of quassia being obtained. The extract is afterwards suspended in hot 90° alcohol, and after standing a few moments the supernatant alcohol is decanted; the process being repeated a second and third time, so as to thoroughly exhaust the extract. The alcoholic liquor is allowed to stand twenty-four hours, during which it deposits extractive matter and salts dis-

<sup>1</sup> From the *Rép. de Pharm.*, n. s., vol. xi., pp. 246-250, (Juin, 1883).

solved by the hot alcohol; the liquid should then be decanted, and sulphuric acid diluted with ten times its weight of 90° alcohol added until a precipitate is thrown down, from 2 to 2½ grams being necessary for each kilogram of quassia. The liquor is then filtered, milk of lime added in the proportion of 12 to 15 grams per kilogram of wood (or 4 to 5 grams of caustic lime), and after some hours' contact, it is passed through muslin and the deposit washed with alcohol and pressed, as it is very spongy and contains much alcoholic liquor.

The liquor being alkaline after the treatment with lime it is neutralized by a current of carbonic acid, and then again filtered. Thus prepared the liquor has a light amber tint. It now remains only to distil the alcohol and to dry the residue from the distillation. Each kilogram of quassia yields by this process about 8 grams of a friable and easily pulverized product which is the amorphous quassiin of Adrian.

If, instead of amorphous, it be desired to obtain crystallized quassiin, the distillation should be stayed while there yet remains a small quantity of alcohol in the product, which is then poured boiling upon a moistened filter to separate the resin. This filter should be so placed that the liquor may be received in a porcelain capsule. The remainder of the alcohol is then evaporated by heating to 80°C., and as the alcohol volatilizes, the quassiin crystallizes out and is deposited. As soon as the liquor contains no more alcohol, it is withdrawn from the fire; when in a few minutes and before the liquor has quite cooled it forms a crystalline mass. When quite cold, the mother liquor is decanted and the crystals are washed several times with distilled water. The quassiin thus obtained is not quite pure; it still contains some resin and uncrystallizable quassiin. To purify it, it is dried, and then dissolved by heating it in twice its weight of 95° alcohol. It is then placed to crystallize in a funnel with a very short neck closed by a cork stopper; in cooling, the quassiin crystallizes, and after ten or twelve hours, forms a mass. The stopper is then removed and the alcohol, which has been used in crystallizing, is displaced by 90° or absolute alcohol, in order to wash the quassiin. As the crystallizing liquor draining away is replaced by fresh alcohol, the colored quassiin is seen to become white; a second crystallization suffices to render it very pure; the result is from 1¼ to 1½ gram per kilogram of quassia.

The mother liquor and the wash waters of the first crystallization

retain a considerable quantity of quassia, which it is difficult to entirely extract. A large proportion may be obtained by shaking these liquors several times with chloroform, which dissolves the quassia and separates very easily from the aqueous liquor. The chloroform is distilled off, and in this way the non-crystallizable quassia is obtained, it being deposited from the alcoholic solution as a granular resinoid substance, which is very easily softened by heat. Its bitterness is nearly equal to that of the crystallized quassia. Repeated treatments with chloroform have failed to remove from the aqueous solution the whole of this quassia, which seems to be combined with mineral salts that it still contains.

The alcohol which has been used in the crystallization, as well as that used in the washing, contains also in solution a little quassia both crystallizable and uncrystallizable, which may be obtained by the same process as above described.

### Résumé.

	Crystallizable quassia.	Uncrystallizable quassia.	Mineral salts.	Resin and other organic matters.
Viscous brown amorphous quassia, in 100 parts, contains, .....	00 to 00	12 to 15	35 to 40	45 to 50
Yellow amorphous quassia, in powder, contains, in 100 parts.....	18 to 20	18 to 20	25 to 30	30 to 35

In brown quassia, potassium salts predominate.

In yellow quassia, calcium salts.

Crystallized quassia is white, light, very soluble in chloroform, soluble in about 90 parts of cold absolute alcohol, in 35 to 40 of 80° alcohol, scarcely soluble in ether, and soluble in about 300 parts of hot water, from which it recrystallizes on cooling.

Uncrystallizable quassia is very soluble in absolute alcohol, more soluble in ether than crystallized quassia, and less soluble in water.—*Phar. Jour. and Trans.*, Dec. 29, 1883.

**Succinate of Iron in Biliary Colic.**—Dr. Jas. A. Stewart, of Baltimore, revives the claim that the hydrated succinate of the peroxide of iron is efficient in the treatment of gall-stones. He reports one case in which a patient, a lady of forty, who had suffered for three months and was greatly emaciated, recovered health rapidly under drachm doses of the succinate. There had been no trouble for two years.—*Louisv. Med. News.*

## TINCTURE DEPOSITS.<sup>1</sup>

BY R. A. CRIPPS.

*Contribution from the Research Fund of the School of Pharmacy Students' Association.*

Every pharmacist must have noticed the fact that most of his tinctures, after having been filtered, deposit sooner or later a more or less bulky sediment. The importance of knowing the nature of these deposits at once suggests itself to every one. Is it that they contain some of the active principles of the drugs, or are they only gummy or albuminous matter, of no value in medicine? It is with the view of throwing some light upon this question that I have undertaken their investigation, feeling that my work, however imperfect, will be one step towards a deeper knowledge of the chemistry of some of the pharmacist's practical difficulties.

1. *Tinctura Calumbæ*.—The deposit in this tincture usually occurs in flaky pieces of a light olive-brown color, mixed with a gummy-looking substance of the same nature. Under the microscope the sample under examination formed a very interesting object, as it consisted principally of finely-formed starch granules, similar to a mixture of arrowroot and wheat starches, showing very distinctly the hilum and concentric rings, and with the polariscope a fine black cross; with the starch was mixed a quantity of matter of no definite structure, and a few very fine tubular vessels of a bright yellow color.

The starch was confirmed by adding iodine to the cooled decoction of the deposit, when the usual blue color was developed.

After washing well with proof spirit (until the washings passed nearly colorless) the deposit was boiled with water, and afterwards with very dilute sulphuric acid; it gave a brownish-yellow solution, which on dilution with spirit, boiling and addition of dilute solution of iodine in iodide of potassium, gave no green spangles indicative of berberine, nor did it possess any markedly bitter taste, showing the absence of more than traces of colombin or colombic acid.

The deposit in tincture of calumba may therefore be said to contain none of the active principles of the drug, and, except for the inconvenience of filtering, is of no consequence.

<sup>1</sup> Read at a meeting of the School of Pharmacy Students' Association, Nov. 29.



*Tinctura Cardamomi Composita*.—This deposit occurs principally in minute crystals of a dirty white color, with a small proportion of a flocculent substance. The crystalline form is well shown by a low power of the microscope, which reveals several different forms, a few octahedra, while others are hexagonal prisms with pyramidal apex and base, besides others more difficult to make out.

The deposit was first washed with proof spirit until the washings passed colorless or nearly so, then boiled with water and filtered. The filtrate was examined for metals, very carefully for potassium, and also for tartaric acid, but gave no evidence of the presence of either, proving that the deposit is not acid tartrate of potassium, as I think is the usual opinion.

The precipitate was then boiled with a strong solution of sodium carbonate for about three hours and filtered. The insoluble portion was examined for metals, *calcium* was alone found.

Looking at the constituents of the tincture I find that the deposit must consist of one or more of the following:—Tartrate or malate of calcium or oxalate of calcium.

The alkaline filtrate was therefore divided into four portions. To the first was added excess of solution of acetate of lead, the precipitate filtered off and dried upon a water-bath, ammonia added again dried, then a few more drops of ammonia, and lastly digested with alcohol, which would dissolve any malate of ammonium if present; on evaporation of the alcoholic solution no residue was obtained, proving absence of malate of calcium.

To the second portion excess of acetic acid was added, then solution of calcium chloride; no precipitate was formed, showing absence of oxalate of calcium.

To the third portion nitric acid was added to exact neutrality, a slight excess of nitrate of silver, and lastly ammonia in slight excess; on boiling for a short time a fine mirror of silver was obtained on the sides of the tube, giving strong suspicion of tartaric acid.

To the fourth portion were added excess of acetic acid, a little potassic hydrate, then more acetic acid (to ensure acidity), and lastly a small quantity of alcohol. On setting aside for a short time a white crystalline precipitate formed, which on the addition of strong sulphuric acid and gently warming gave off the odor of burnt sugar, indicating the presence of *tartaric acid*.

A small portion of the original aqueous solution was boiled with

Fehling's solution, but gave scarcely any evidence of sugar, probably not more than due to adherent tincture. The deposit in tr. card. co. is therefore almost entirely tartrate of calcium.

*Tinctura Chloroformi Composita*, B.P.—As might be expected, this deposit is the same as that occurring in tinct. cardam. comp.

*Tinctura Cinchonæ Composita*, B.P.—This deposit was of a dark reddish brown color, and in a state of very fine division, not at all aggregated into lumps or scales. 1.769 gram was treated as described further on under tinct. cinchonæ flav., and yielded .0542 of a gram or 3.064 per cent. of total alkaloids. The acid solution of alkaloids was scarcely fluorescent, and gave only a faint green coloration with bromine and ammoniac hydrate, indicating only traces of quinia or quinidia. A saturated solution of the sulphate, when shaken with half its volume of ether and excess of ammonia, afforded abundant evidence of the presence of cinchonia.

The coloring matter of cochineal was also present, as shown by the color imparted to dilute HCl on boiling with the deposit, and by the addition of sulphate of zinc and ammoniac hydrate in excess, when a fine violet tint was developed; ammoniac hydrate alone giving a deep claret coloration.

The presence of cochineal entirely masked any reactions for cinchonated which may have occurred.

Ferric chloride gave a faint reaction for cinchotannic acid.

The deposit was found to contain 3.064 per cent. of alkaloids, chiefly cinchonia, probably existing as cinchotannates; and a little coloring matter from the cochineal.

*Tinctura Cinchonæ Flavæ*, B.P.—Three samples of this deposit were examined, they varied much in appearance and nature.

*First sample.*—This was of a brown color. Being in small quantity only it was simply tested for the presence quinia and other alkaloids. It was well washed with proof spirit, to free it from adherent tincture, dried and mixed with milk of lime, thoroughly dried over a water-bath and extracted with chloroform. The chloroformic solution was shaken with dilute sulphuric acid (to dissolve out alkaloids as sulphates) and washed with water till free from bitterness. The acid solution of alkaloids thus obtained was shaken with chloroform and ammonia in slight excess, and the chloroformic solution separated and evaporated to dryness.

The residue which consisted of the pure alkaloids was now tested

for quinia. 1st. By dissolving a little in dilute  $\text{H}_2\text{SO}_4$ , adding bromine water and then ammoniac hydrate. A fine green coloration, due to thalleoquin appeared. 2d. The remaining alkaloid was dissolved in a small quantity of hot dilute  $\text{H}_2\text{SO}_4$ , exactly neutralized with ammoniac hydrate, still being kept hot, and set aside for a short time. An abundant supply of crystals appeared, showing the presence of quinia.

*Second sample.*—This sample was much lighter in color than the other two, and far larger in proportion to the amount of tincture from which it separated. It was first examined quantitatively for alkaloids and for quinia. 7.237 grams were treated as above, the extraction with chloroform being performed in a “Dunstan and Short’s apparatus for continual extraction,” which I find by far the best for the purpose. After evaporation of the chloroformic solution the residue was dissolved in dilute  $\text{H}_2\text{SO}_4$ , heated upon a water-bath, exactly neutralized by  $\text{AmHO}$  and set aside to crystallize, filtered, well drained, and again dissolved in boiling water, set aside, the crystals collected, drained, dried at  $100^\circ\text{C}$ . and weighed. 0.156 of a gram was obtained, to which was added 0.0876 of a gram, being the amount of quinia sulphate retained by the mother liquors, equivalent to 2.94 per cent. of quinia, or 3.204 per cent. of crystalline sulphate of quinine. The mother liquors were now precipitated by ammonia and the alkaloids taken up by chloroform, which solution, on evaporation, yielded .3182 of a gram of alkaloids, from which was deducted .0697 of a gram (the quinia present) leaving .2485 of a gram of alkaloids, not quinia, or 3.433 per cent.

The deposit, therefore, contains—

Total alkaloids.....	6.374 per cent.
Quinia.....	2.940 per cent.

Cinchotannic acid was proved by distilling the dry deposit, when an odor resembling carbolic acid was developed, and the distillate when tested with bromine water gave a white precipitate which rose to the surface of the liquid (tribromophenol); and by the slightly acid extract giving a faint greenish coloration with ferric chloride. Cinchona-red was proved as below.

*Third sample.*—This was of a very dark color, having the appearance of cinchona-red. 1.35 gram was treated as before for alkaloids. The yield was only .034 of a gram or 2.52 per cent. The solution was only faintly fluorescent. On attempting to crystallize out the

quinia as sulphate, I succeeded in getting only a few very minute crystals, quite insufficient to weigh; and on testing for quinia by the thalleioquin test, I obtained only a faint reaction. A saturated solution of the sulphates, when mixed with half its volume of ether and excess of ammoniac hydrate, afforded abundant evidence of the presence of cinchonidine.

Cinchotannic acid was proved as before.

Warmed with potassic hydrate or acetic acid it imparted a deep brown-red color to the solution, due to cinchona-red.

From these three examples it will be seen that the deposit contains a very varying amount of alkaloids, and although the two latter were from tinctures prepared strictly according to the B.P. (the first I am not certain of), their nature both physically and chemically was very different.

*Tinctura Ferri Acetatis.*—This was washed with water; the first washings were found to contain free acetic acid. The deposit was then dried and weighed = .1833 of a gram, dissolved in diluted HCl, diluted, and the iron precipitated in the usual manner by AmHO. The precipitate, after washing and drying, weighed .1279 of a gram, that is to say, the deposit represents 69.77 per cent. of oxide of iron,  $\text{Fe}_2\text{O}_3$ .

Ferric oxyacetate,  $\text{Fe}_6\text{O}_7(\text{C}_2\text{H}_3\text{O}_2)_4$  represents 70.175 per cent. of ferric oxide.

*Tinctura Gentiane Composita.*—This deposit was of a grey color, and was mixed up with tow. It was first washed with proof spirit until the washings passed colorless or nearly so. Examined microscopically it was seen to consist mostly of very small starch granules, about the size of rice starch, but oval rather than angular. Some of the deposit was then gently boiled with water, cooled and solution of iodine added; a greenish-blue color appeared, confirming the presence of starch. It was then washed with cold water, and the washings filtered and evaporated to dryness over a water-bath. The residue was nearly white and possessed no bitter taste, proving absence of gentiopierin. Portions were then tested as follows:—1st. A small quantity was boiled with potash solution, a yellow color was produced. 2d. Another portion was tested with Fehling's solution, which it quickly reduced. 3d. To a drop of solution of borax was added one drop of solution of phenol-phthalein, and then a few drops of the aqueous solution of residue. The pink color was not discharged. The



first two experiments show that the residue was sugar, and the last that the sugar of gentian is not a polyhydric alcohol, such as glucose.<sup>1</sup> In order to prove that this was the same sugar as exists ready formed in the root, I prepared a decoction of gentian, filtered, and tested as before with phenol-phthalein and borax; obtaining the same results. The remainder of the deposit was washed with strong, hot alcohol, and the alcoholic solution evaporated to dryness. The residue was too minute for examination, but had the appearance of an oily resin, which formed a yellow solution with caustic potash. It had no bitter taste. After washing with alcohol the residue consisted of albuminous matters and starch mixed with tow. Starch and gentian sugar, mixed with albuminous matter, are, therefore, the constituents of the deposit of tinct. gent. co., the first having no doubt slipped through the filter, as starches frequently will.

*Tinctura Ipecacuanhæ Concentrata.*—This is not an official tincture, but as it is somewhat largely used in some parts of the country, I have examined it qualitatively for emetine. After washing with weak spirit, it was dried, mixed with milk of lime and again dried, warmed with chloroform, the solution filtered and evaporated on a water-bath. Scarcely any residue was left, and on treating with calcium hypochlorite and acetic acid no yellow color was produced, indicating absence of emetine.

*Tinctura Lobeliæ Inflatæ Ætherea.*—This deposit occurred as a somewhat flaky, white sediment; it does not occur in the tincture made with proof spirit.

It was first washed with spirit of ether, and shaken up with water, the aqueous liquid tested by Mayer's reagent for the presence of alkaloid, but found to contain none, and on boiling the deposit with water no odor of lobeline was developed, even on the addition of ammoniac hydrate. After boiling, the deposit assumed a resinous appearance, and was of a greenish-white color. Some of this resin (?) was treated with caustic potash, but was insoluble; it dissolved perfectly in ether, from which solution it was precipitated by alcohol as a nearly white resin (?). Benzol, chloroform, and bisulphide of carbon also dissolved it freely. It gave no characteristic reaction with any of the ordinary reagents for resins.

*Tinctura Quiniæ.*—The sample of tincture from which this deposit

<sup>1</sup> See *Pharm. Journ.* [3], vol. xiv., p. 41; Dunstan on Polyhydric Alcohols.

was obtained was not prepared according to the official directions, but the quinine was dissolved in the tincture of orange by the aid of a small quantity of acid. It was white and soluble in water; on examination it proved to be sulphate of calcium.

Mr. Hustwick has shown (*Pharm. Journ.*, [3], iii., p. 722), that this deposit is formed during three days used in its preparation by the pharmacopœial method, and that another deposit is formed subsequently at low temperatures, consisting of tannate of quinine. I have not been able to obtain any of this latter deposit.

*Tinctura Rhei.*—The deposit, which was of a greyish-brown color, was washed with proof-spirit as before, until the washings ran through only slightly colored, then dried and extracted by benzol, first in the extraction apparatus, and then by boiling. A yellow solution was formed which on evaporation left a residue too small for further purification and was, therefore, weighed as slightly impure chrysophanic acid. 1.485 of a gram yielded .018 of a gram of chrysophanic acid = 1.2 per cent. This residue was shown to consist of chrysophanic acid by yielding a fine rose-colored solution with dilute ammonia, which solution gave a lilac to rose-colored precipitate with acetate of lead.

The remaining portion of the deposit was boiled with water, and, as it still gave evidence of the presence of chrysophanic acid, was boiled with very dilute ammonia until exhausted; the ammoniacal solution filtered, washed, and shaken with chloroform after acidulating with acetic acid. The chloroformic solution was evaporated to dryness and the residue weight .0142 of a gram = .96 per cent. which, with that already obtained, equalled 2.17 per cent. of chrysophanic acid in the deposit.

The residue after the above treatment was now washed with dilute hydrochloric acid, and the solution gave evidence of oxalate of calcium in considerable quantity. Another portion of the deposit, .5634 of a gram, was therefore taken and the ash estimated by ignition, it corresponded to 29 per cent. of the deposit, and consisted chiefly of carbonate of calcium, due to the decomposition of the oxalate, also a small quantity of magnesium, but no potassium. The deposit in *tinct. rhei.* therefore contains 2.17 per cent. of chrysophanic acid and about 37 per cent. of oxalate of calcium. I had not enough of the deposit to test it for cathartic acid, which is the purgative principle of the drug. The remainder, apparently, consisted of gummy matters.

NOTE.—It will be observed that no reference is made to the *amount*

of deposit formed in the above tinctures, I had the opportunity of judging roughly in a few only, viz.:—Tinct. cinchonæ,  $\frac{1}{4}$  oz. from 1. gallon; do., 3j. from 1 gallon; tr. calumbæ, 3iss. from 1 gallon. I should be glad to receive any deposit, especially those from the more potent tinctures, for further examination.—*Phar. Jour. and Trans.*, Dec. 22, 1883.

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## HIPPURATE OF SODA.

BY PETER BOA.

*Read at a meeting of the North British Branch of the Pharmaceutical Society, December 19, 1883.*

At our last meeting there was exhibited a specimen of hippurate of soda. This salt is perhaps deserving of more than the incidental notice which it then received, on account of the recent suggestion of Dr. Garrod to employ the alkaline hippurates in diseases arising from excess of uric acid in the system. In the course of his experiments he made the observation that hippuric acid, when allowed to remain in contact with uric acid, caused the disappearance of the latter.

It may be noted that there are three forms in which nitrogenized waste is eliminated from the system by the kidneys, viz.: as urea, uric acid and hippuric acid. Of these uric acid is the least soluble. It is practically insoluble in water, and the salts which it forms are but slightly soluble. On account of this characteristic it is, although forming only a very small part of the excreted waste, frequently the cause of disease, owing to its liability to form concretion in the kidneys, giving rise to gravel and calculus, and in the form of urate of sodium it may deposit in certain tissues, and give rise to gouty and rheumatic symptoms.

In herbivorous animals the renal excretions rarely contain uric acid, but hippuric acid is always present. Uric acid is probably formed at one stage, but the presence of hippuric acid in considerable quantity effects its decomposition. Hippuric acid forms salts which are extremely soluble.

To approximate, therefore, the excretions from the kidneys of man to those of the herbivora, is to make an important step towards the prevention or removal, as the case may be, of the cause of diseases which arise from the defective elimination of uric acid. This may be attained by the employment of such a salt as hippurate of soda.

Dr. Garrod says: "There is no doubt that if hippurate of soda be added to a blood serum which shows the presence of a urate, the latter is soon removed from it."

I make these preliminary remarks merely to show on what grounds the introduction of this remedy is based. In view of the salt coming into general use, I have made a number of experiments in regard to its behavior towards other substances with which it might be administered in combination.

There are only two forms in which we shall likely be called upon to dispense it, namely, in powders and mixtures, and in regard to these only have I made experiments. Avoiding details, I shall summarize the results which seem worth recording.

(1.) *Powders.*—The hippurate of soda itself, dispensed in powder form, keeps quite well in paper. Combinations of the salt with lithia carbonate and citrate and bicarbonate of potash and soda, put up in powders in the usual way and kept for a fortnight, were found on examination to be in as good condition as when prepared.

(2.) *Mixtures.*—Like all alkaline salts, the taste of hippurate of soda is disagreeably saline. I have tried a number of combinations with the object of rendering its administration as pleasant as possible, and the results may be briefly stated.

Chloroform water or spirit of chloroform seems to make it more disagreeable, rendering it almost nauseous.

Infusion of calumba disguises the saline taste, and where the bitter is not an objection, affords an eligible vehicle.

The most agreeable mixtures, however, are obtained by employing syrup and peppermint water, or glycerin and cinnamon water.

The following examples may suffice:

- |                       |                             |
|-----------------------|-----------------------------|
| (1.) R Sodæ hippurat. | gr. 80                      |
| Lithiæ carb.          | gr. 24                      |
| Glycerin.             | ʒiv                         |
| Aq. cinnam.           | ad ʒviij                    |
| M. Sig.               | One-eighth part for a dose. |
| (2.) R Sodæ hippur.   | ʒij                         |
| Potass. citrat.       | ʒiij                        |
| Syrupi                | ʒvj                         |
| Aq. menth. pip.       | ad ʒvj                      |
| M. Sig.               | Tablespoonful for a dose.   |

The addition of an alkaline carbonate or citrate as given in the



foregoing is desirable, so as to imitate the condition of the renal excretion of the herbivora, which is alkaline, that of man being usually acid.

The salt is very soluble. Fifty grains dissolve in thirty minims of water, forming a syrupy liquid. The dose may be from ten to fifteen grains.—*Phar. Jour. and Trans.*, Dec. 29, 1883.

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## THE SOLUBILITY OF CALCIC HYDRATE IN WATER AT DIFFERENT TEMPERATURES.

BY THOMAS MABEN.

*Read at a Meeting of the North British Branch of the Pharmaceutical Society, December 19, 1883.*

In the course of an able paper on "Lime Water; its Preparation, Preservation and Estimation," read some time ago by Mr. Abraham, of Liverpool, and subsequently published,<sup>1</sup> the author stated that he had found a difficulty in maintaining his lime water at the proper strength. On investigating the cause of this he was led to the conclusion that the difference was due to increase of temperature, and he indicated that the solubility of calcic hydrate fell from 0.56 grain CaO per fluidounce at 60°F. to something like 0.5 grain at 70°F.

Having had occasion in July last to give a few notes (which were afterwards published in an extended form<sup>2</sup>) on the same subject before a local association, I undertook at that time an investigation as to the effect of temperature on solubility, and though my experiments were confirmatory of Mr. Abraham's to a certain extent, the results did not show such a marked difference as his had done. I have recently repeated these experiments with more care than before, and now bring the results before you, in the hope that they may prove of some interest.

I have been much surprised, in looking into various authorities, to find that great differences of opinion prevail regarding the solubility of calcic hydrate. A few of these may be noted. At 15°C. calcic hydrate is held in solution to the extent of 1 part CaO in 781 parts water, according to Squire; 780 (Miller and Bineau); 778 (Dalton); 776 (Paris Codex); 764 (Hager); 750 (United States Pharmacopœia);

<sup>1</sup> "Pharm. Journal" [3], xiii, p. 433.

<sup>2</sup> "Chemist and Druggist," 1883, p. 390.

730 (Wittstein); 500 (Ure), and 450 (Davy). At 100°C. 1 part is dissolved in 1,560 water, according to Miller; 1,500 (Bineau); 1,350 (Wittstein); 1,305 (Hager); 1,300 (United States Pharmacopœia), and 1,270 (Dalton).

According to the German Pharmacopœia *aqua calcaricæ* should contain calcic hydrate equal to from 0.43 to 0.49 gr. CaO per fluidounce; the United States Pharmacopœia gives the amount in solution as about  $\frac{1}{2}$  grain, while the British Pharmacopœia requires *liq. calcis* to contain .56 gr., *i. e.*, to be as nearly as possible a saturated solution.

According to Storer, Dalton disputes the correctness of the statements of observers who say that water takes up  $\frac{1}{500}$  or  $\frac{1}{600}$  its weight of lime, the fact being, he says, that few have tried the experiment with due care.

In estimating the strength of solutions of calcic hydrate it is of the utmost importance that we should ascertain correctly the temperature at which the solutions pass through the filter. This is a matter of considerable difficulty. I have found that different methods give quite different results, and there is not the slightest doubt, in my opinion, that had the authorities quoted carefully followed an uniform system their results would have been much more in accord than they are. It is sufficiently obvious that out of the eight or nine different solubilities quoted not more than one can be absolutely correct, and while the question is not one of crucial importance it would be extremely interesting if by some means or another the real figure could be arrived at.

In the experiments which form the basis of this communication I adopted the following method, it having been found to give the most constant results.

For the lowest temperature I placed a glass beaker containing calcic hydrate and distilled water in a freezing mixture till the thermometer fell to 0°C., and ice began to form. The liquid was then filtered, zero being maintained by placing the funnel also in a freezing mixture. The temperatures from 5°C. to 15°C. present no special difficulty, as they are easily obtained by adding hot or cold water to the beaker till the required point is reached and filtering in the usual way. Comparatively little variation takes place when the surrounding atmosphere indicates from 10°C. to 12°C. From 15°C. to 80°C. I made use of the water-bath. A flask containing lime and water was placed in the bath, and as soon as the contents reached the required temperature, the mixture was filtered through a funnel placed in the ordinary funnel

space in the bath. The water surrounding the funnel, being always at the same temperature as that surrounding the flask, it was hardly possible for any variation to take place, but in order to insure accuracy the thermometer was used in the funnel as well as in the flask. For the temperatures above  $80^{\circ}\text{C}$ . the solutions were heated over the naked flame and passed through a funnel kept in boiling water. It is exceedingly difficult, unless with special appliances, to filter at the boiling point, and I had to be content with what I have described. Strictly speaking, the maximum point reached would be from  $98^{\circ}$  to  $99^{\circ}\text{C}$ .

For the sake of convenience, quantities by volume were taken, a small graduated flask being employed as a measure.

The amount of lime in solution was ascertained volumetrically, decinormal nitric acid being used. This acid is preferable to oxalic, as calcic nitrate being soluble in water there is no danger of the exact point of neutrality being obscured by the presence of a precipitate.

Calcic oxide, perfectly free from all impurities, was made use of, after having been slaked with distilled water. Incidentally, I may remark that the heat generated in "slaking" the lime rose to the very high point of  $205^{\circ}\text{C}$ .

The results which were arrived at have been tabulated in three ways for the sake of convenience, and are appended. The figures are in each case calculated from the mean of three titrations, but where thought necessary corroborative results have been obtained by additional experiments.

It will be observed that the solubilities are expressed in terms of calcic oxide. I express them so, in accordance with custom, although it is apparent that the calcium exists in solution as hydrate and not as oxide.

I am unwilling to close this note without a few words as to its practical bearing upon the *liquor calcis* of the British Pharmacopœia. Repeated proceedings have been instituted against druggists for the sale of defective lime water, and cases have been reported where the strength was as low as 0.1, 0.2 and 0.3 gr.  $\text{CaO}$  per fluidounce. Several hypotheses might be started to account for this state of things, and I shall briefly allude to one or two of these.

In the first place, it is obvious that the variations of temperature which naturally occur really exercise comparatively little influence on the strength of lime water, for it can rarely happen that the tempera-

ture of a shop will rise above  $32^{\circ}\text{C}$ . ( $90^{\circ}\text{F}$ .), and yet at that point water holds in solution about 0.5 gr. CaO per fluidounce.

Neither can we account for these faulty waters on the hypothesis that undistilled water had been used in their preparation, unless, indeed, the water had been altogether exceptional in permanent hardness. I have found that a water containing about 10 grains of total solids per gallon gives lime water of full strength. At the same time this does not alter the fact that only distilled water should be employed in preparing *liquor calcis*.

Other two hypotheses remain, either of which would furnish a sufficient cause for even the weakest lime water. One is that the calcic hydrate, not having been properly stored, had almost entirely changed its constitution and become carbonate; the other, that the solution, after decantation or filtration, had been so badly kept that the lime originally present had all or nearly all been precipitated. It is a well-known fact, and one which is daily made use of by the agriculturist in the application of lime to the soil, that if burnt lime be exposed to the atmosphere, even for a very short time, it passes over into the milder form of carbonate. The same reaction, of course, takes place on the shop shelves, and if slaked lime is not kept in an air-tight vessel, it necessarily follows that it will deteriorate, owing to the absorption of  $\text{CO}_2$ . If, forgetting this, any pharmacist has been careless in storing the slaked lime, it need not be wondered at if his lime water is weak.

I have found that lime water can be made of full strength with calcic hydrate, mixed with 15 per cent. of carbonate; with equal parts of hydrate and carbonate I obtained 0.5 gr. CaO per fluidounce; with 25 per cent. hydrate and 75 carbonate, 0.4 gr.; and with 10 per cent. hydrate and 90 carbonate, the amount dissolved was only 0.1 grain.

It is stated in almost every text-book that calcic carbonate is insoluble in water, and if this is so these results are, to say the least, very singular. I have been able, however, to find several authorities who differ from the popular belief. Among others, Thorpe<sup>1</sup> states that a litre of water dissolves 0.1 gram  $\text{CaCO}_3$ , that is in the proportion of 10,000 to 1. My own experiments go to prove that 40,000 to 1 is nearer the mark, but whatever the solubility is it is quite appreciable, and the alkalinity can readily be estimated.

<sup>1</sup> "Inorganic Chemistry," vol. 1, p. 107.



The U. S. Pharmacopœia states that "the alkaline reaction of the liquid entirely disappears after it has been saturated with carbonic acid gas, and the excess of the latter has been expelled by boiling (abs. of alkalis or their carbonates)." This, however, is not so; the liquid after boiling is still alkaline, though of course not to any large extent, and the test as it stands is therefore worthless.

The other hypothesis is similar in principle to that just explained. If after filtration the lime water is kept in vessels of too large a capacity, or in unstoppered bottles, calcic carbonate is rapidly deposited. Even when most carefully preserved, this takes place to a certain extent, the coating of carbonate inside the shop bottles being a familiar sight to all of us. This is of itself quite sufficient to account for occasional inferior specimens, and it will be remembered was the defence urged at a recent trial; but if there is reason to suspect that the lime water is habitually weak, the explanation would probably be found in the fact that the stock of lime was for the most part in the form of carbonate.

It is difficult to understand why the presence of carbonate should prevent the solution of the hydrate when the latter is present in sufficient quantity to saturate the water, but I have repeatedly proved that it does so, whatever be the explanation of the fact.

*Solubility of Calcic Hydrate at Different Temperatures.*

Temperature. Deg's C.	Expressed in grains CaO per fluid- ounce.	Expressed as 1 part CaO in parts water.	Expressed as parts CaO in 100 parts water.	Temperature. Deg's C.	Expressed in grains CaO per fluid- ounce.	Expressed as 1 part CaO in parts water.	Expressed as parts CaO in 100 parts water.
0	*576	759	*131	55	*396	1,104	*09
5	*572	764	*130	60	*385	1,136	*088
10	*568	770	*129	65	*362	1,208	*082
15	*561	779	*128	70	*354	1,235	*08
20	*553	791	*126	75	*333	1,313	*076
25	*526	831	*120	80	*321	1,362	*073
30	*507	862	*116	85	*315	1,388	*072
35	*481	909	*109	90	*277	1,579	*063
40	*469	932	*107	95	*265	1,650	*06
45	*444	985	*101	99	*265	1,650	*06
50	*429	1,019	*098				

## ACTION OF CERTAIN VEGETABLE ACIDS ON LEAD AND TIN.

BY F. P. HALL.

Taking into consideration the large quantities of tinned food which are constantly being consumed, the author has thought it expedient to study the action of various organic acids on the materials which are exposed in the interior of the cans, viz., tin and lead. The present paper contains the results of experiments on this subject, and also investigations on the quality of tin plate and tin foil used as covers for food products.

The first series of experiments were conducted to determine quantitatively the action of the more common vegetable acids on the metals in question, all previous quantitative work in this direction having been made with acetic acid only. First of all, in order to test the effect of alloying on the corrosion of the metals, the amount of tin dissolved, when pure, was compared with the amount dissolved under the same conditions from an alloy exposing the same surface of the metals in question. This was effected by proportioning the size of the plates of pure metals according to the composition of the alloy. Three alloys were made, taking into consideration the specific gravities of the metals, one with equal parts of each metal, one with excess of tin, and one with excess of lead. The metals were fused, well mixed together, cast into thin sheets in iron moulds, rolled into thin strips, and cut into pieces  $\frac{1}{2}$  inch wide and 12 inches long, thus exposing one-fifth of a square foot surface. The tin and lead strips were of the same width, but varied in length for the reason stated above. The acetic acid solution employed contained 5.75 per cent. of acid, the solutions of tartaric and citric acids were made to an equal degree of acidity. After an exposure of two weeks to the action of the acids at  $25^{\circ}$ – $35^{\circ}$ , all the metals were found to be tarnished more or less, the tin more so than the lead; two of the alloys were sprinkled with small black crystals of lead; the smallest pieces of lead in tartaric acid were covered with transparent crystals of lead tartrate. The solutions containing tin were yellowish, whilst those with lead were clear and colorless. The pieces of tin were covered with a dusty powder. The strips of metals were taken out, washed, dried, and weighed. The solutions were precipitated with hydrogen sulphide.

Surface exposed in sq. inches,	Per cent. composition.				Acetic Acid.				Tartaric Acid.				Citric Acid.			
					Percentage of dissolved metals.		Total amount dissolved (in grams) from		Percentage of dissolved metals.		Total amount dissolved (in grams) from		Percentage of dissolved meta		Total amount dissolved (in grams) from	
	Lead	Tin.	Lead.	Tin.	Lead.	Tin.	Alloys.	Pure metals.	Lead.	Tin.	Alloys.	Pure metals.	Lead.	Tin.	Alloys.	Pure metals.
7.2	.....	.....	100.0	.....	} 11.54	88.46	0.3744	0.7122	9.73	90.27	0.0298	0.0664	10.15	89.85	0.1626	0.4785
7.2	21.6	65.9	34.1	100.0												
.....	21.6	.....	.....	.....												
14.4	.....	.....	100.0	.....	} 13.57	86.42	0.4110	0.8242	11.23	88.77	0.0374	0.0750	13.42	86.58	0.1565	0.5139
14.4	11.4	60.8	60.8	100.0												
.....	11.4	.....	.....	.....												
21.6	.....	.....	100.0	.....	} 15.46	24.54	0.6476	0.8073	22.92	77.08	0.0349	0.0787	44.58	55.42	0.2203	0.5946
21.6	7.2	80.84	80.84	100.0												
.....	7.2	.....	.....	.....												
7.2	21.6	65.9	34.1	65.9	15.25	84.74	0.0341	0.1332	17.65	82.35	0.0102	0.0400	6.74	93.25	0.0267	0.0644

The lead gave dense black precipitates, finer in the tartaric and citric acids than in the acetic. The tin came down brown in acetic, and yellow and flocculent in the tartaric and citric acids. With the alloys, the precipitates were dark-brown in acetic and light-colored and flocculent in the other acids. The results are given in the above table.

Some similar experiments were now conducted in stoppered bottles. In order to exclude air as much as possible, the bottles were heated, filled with acid while hot; boiled; and at once tightly stoppered. The results are given in the last line of the above table. Another series of experiments proved conclusively that galvanic action did not influence the rapidity of the corrosion, the action generally being slight at first, and increasing as time went on. Dilute acids, if in sufficient quantities, cause more corrosion than stronger ones. Some experiments were next tried on the tins themselves. 200 cc. of the acids were put into three empty tins, tied over with paper, and examined after two weeks. The citric and tartaric acids had removed the tinning. A white powder was deposited in the citric acid solution soluble in hydrochloric acid. The quantities of lead and tin dissolved were as follows:

Metals.	Grams dissolved by		
	Acetic acid.	Tartaric acid.	Citric acid.
Lead.....	0.0117	0.0873	0.1559
Tin.....	0.4178	1.0430	0.6828

In addition to these metals, there was a good deal of iron dissolved. The lead was derived from the solder.

The result of the analysis of various samples of tin plate showed that the superior class or "Bright plate" was tinned with pure tin, and that this quality is the one almost universally used for tinware; the inferior class, or "Terne plate," as is understood, contains lead to the extent of 70 per cent.; it is considerably duller than bright plate, and is used almost exclusively for roofing purposes. The analysis of commercial tin foil proves it to be of a very mixed character, from pure tin to stuff containing 90 per cent. of lead; the latter would prove deleterious if used for cheese or like substances.—*Jour. Chem. Soc.*, Nov. 1883, p. 1038; *Chem. News*, xlvii, 290, 300.



## CÆRULIGNOL: REICHENBACH'S OXIDIZING PRINCIPLE.

BY P. PASTROVICH.

The high-boiling portions of beech-tar oil are characterized by the splendid blue color which they give with chloride of lime, or in alcoholic solution with baryta-water. The separation of the body to which this color is due—called by Reichenbach the “oxidizing principle”—from the other constituents of the tar-oil, is very difficult, but is best effected by boiling the oil for some time with the weakest acetic acid capable of dissolving it, and pouring the resulting solution into a large quantity of water, whereby the oil is separated, while a nitrogenous body remains in solution. The “blue oil,” or Cœrulignol, thus purified, distils between  $240^{\circ}$  and  $241^{\circ}$ ; it is nearly colorless, has a not unpleasant creosote-like odor and burning aromatic taste; sp. gr. = 1.05645 at  $15^{\circ}$ . It dissolves very sparingly in cold, more readily in hot water, and in almost any quantity in alcohol, ether, and acetic acid, forming neutral solutions. It is colored red by strong sulphuric acid, and when mixed with potash-lye, becomes dark colored on exposure to the air. With chloride of lime, and in alcoholic solution with baryta-water, it produces the splendid blue color already mentioned. Its alcoholic solution is colored green by alcoholic ferric chloride; its aqueous solution gives a fine tarmine color with aqueous ferric chloride.

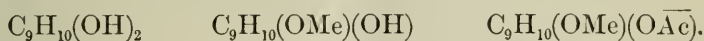
Cœrulignol gives by analysis numbers leading to the formula  $C_{10}H_{14}O_2$ , which is confirmed by the vapor-density (5.69–5.84 by V. Meyer's method; 5.76 by calculation). By prolonged heating in sealed tubes at  $140^{\circ}$  with excess of strong hydrochloric acid, it is resolved into methyl chloride and a body which when purified by repeated crystallization from water and finally from benzene, is found to have the composition  $C_9H_{12}O_2$ ,—its formation, represented by the equation  $C_{10}H_{14}O_3 + HCl = CH_3Cl + C_9H_{12}O_2$ , being exactly analogous to that of the compound  $C_9H_{12}O_3$  from methylic propylpyrogallate. The solution of this body is colored green by ferric chloride, and when mixed with alkalis, gradually acquires a darker color in contact with the air.

*Acetocœrulignol*,  $C_{12}H_{16}O_3 = C_{10}H_{13}\overline{Ac}O_2$ , formed by boiling cœrulignol (3 parts) for two days with one part of acetic anhydride, was once obtained in fan-shaped groups of crystals, but mostly as a viscid nearly

colorless oil, insoluble in water, freely soluble in alcohol, ether, and acetic acid, boiling with partial decomposition near  $265^{\circ}$ .

*Nitrocœrulignol*,  $C_{10}H_{13}(NO)_2O_2$ , formed by treating cœrulignol with nitric acid of sp. gr. 1.2, separates from water or alcohol in honey-yellow crystals, resembling those of picric acid, and melting at  $124^{\circ}$ .

The decomposition of cœrulignol by hydrochloric acid, and the formation of its acetyl-derivative, show that it contains the groups  $OCH_3$  and  $OH$ , and that it may accordingly be regarded as the methyl-ether of a higher homologue of one of the three dihydroxybenzenes, the compound  $C_9H_{12}O_3$  formed from it by the action of hydrochloric acid being this higher homologue itself, which, together with cœrulignol and its acetyl-derivative, may be represented by the formulæ—



To determine from which of the three dihydroxybenzenes cœrulignol is derived, a small quantity of each of these compounds was heated at  $135^{\circ}$  with a drop of nitro-benzene and a drop of strong sulphuric acid, the melt then dissolved in water, and the solution made slightly alkaline,—whereupon resorcinol gave a bright red solution with yellow fluorescence, catechol a blue-violet, and quinol a yellow liquid. Now cœrulignol treated in like manner gave a reaction exactly like that of catechol, and may therefore perhaps be regarded as a homologue of guaiacol (methyl-catechol); but whether it contains a propyl-group or some other groups, must for the present remain undecided.—*Jour. Chem. Soc.*, November, 1883; *Monatsh. Chem.*, iv, 188.

**Vinum Aloes.**—Having a prescription, containing wine of aloes, to put up, and there being none in store, I devised the following formula for its extemporaneous preparation:

Aqueous extract of aloes.....	$\frac{1}{2}$ oz., av.
Tincture of cardamom.....	flʒv.
Tincture of ginger.....	flʒss.
White wine enough to make.....	Oss.

Dissolve the extract in the wine and add the tinctures.

The tinctures bring the alcoholic strength of the wine to that of the stronger white wine. This makes a clear solution and is up to the required strength of U. S. P.

Maybe this is worthy of a place in the Journal. E. G. EBERLE.

## VARIETIES.

EFFECT OF ALUM GARGLES UPON THE TEETH.—M. Young ("Courier Med."), prescribed a gargle containing a small proportion of alum for a woman suffering from chronic pharyngitis with catarrh of the middle ear. The patient, finding relief, continued its use for some three weeks. But perceiving that, at meals, her teeth began to crumble into little pieces, she consulted her dentist, who considered it due to the alum gargle, as when the enamel is removed from the teeth the alum breaks down the dentine. To prevent this it is best, immediately after using an alum gargle, to wash the mouth out with a solution of bicarbonate of soda or an alkaline water.—*Med. and Surg. Reporter*.

MINERAL WATERS.—When one day there comes to be written, from the standpoint of modern science, a history of human superstition, those chapters of the work which deal with belief in the various virtues from time to time accredited to waters, either of miraculous or of natural origin, will assuredly not be either the shortest or the least interesting. No one who has visited one of the springs which occur in almost every rocky range from the Granipian to the Pyrenees, and which a ready faith invests with supernatural curative power, can see much reason to expect that such belief will suffer measurable diminution for many generations. With the mineral spring proper the case is different; and while it seems long to look back to the time when the temples to Esculapius were erected near to such sources, and while it is true that even to-day much mysticism is allowed to surround the subject, the chemist of the age is in a position to assert that the curative action of any given mineral water is a result of the combined therapeutic action of the sum of its constituents.—*Medical Press; Louisv. Med. News*.

NITRITE OF SODIUM.—Drs. Ringer and Murrell have concluded that the ordinarily prescribed dose (20 grs.) is dangerously large. From some observations of Dr. A. H. Baines, in the *Lancet*, December 1, 1883, it seems that this drug is often adulterated with nitrate of sodium, and from this fact has arisen the supposed necessity for such large doses. If we can procure the pure drug, and we ought to do so if we use it at all, two or three grains will be the dose. Dr. Baines reports a case of petit mal in which its use was very beneficial.—*Med. and Surg. Rep.*, Jan. 19, 1884.

CORROSIVE SUBLIMATE IN GONORRHOEA.—Dr. Joseph McChesney, of Deming, New Mexico, contributes to the *Therapeutic Gazette*, for December, a report of a series of seven cases of gonorrhoea in which he employed by way of treatment only a solution of corrosive sublimate, one grain to six ounces of water. The results are already very surprising. In several of these cases this injection was resorted to after a long and unsuccessful course with the ordinary remedies in such cases, and the result was uniform success. He resorts to these injections, which he gives once every four hours, after the subsidence of the acute stage. He is very confident that,

properly applied, this solution will effect a cure of the gonorrhœa within from eight to ten days after it has been resorted to.

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USE OF MILK SUGAR.—Dr. V. Poulain believes that the reason that cow's milk so often disagrees with children is to be found in the fact that cane sugar is used to sweeten it. In the *British Med. Jour.*, June 30, 1883, he says that for thirty-three years he has used the sugar of milk with the best results.—*New Eng. Med. Monthly*, January, 1884, p. 190.

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PARALDEHYDE — ACETAL — CANNABINUM TANNICUM. — Dr. Eickholt contributes an article on these drugs to the *Deutsche Med. Woch.*, December 5, 1883. The two first he does not like, considering them uncertain as hypnotics, and that they possess injurious properties (such as deranging digestion, producing nausea, and the like), that more than counterbalance their virtues. Cannabinum tannicum (derived from Indian hemp), in doses of  $\frac{1}{2}$  to 1 grain, he considers especially useful in neurasthenic insomnia, and in mild melancholia without delusions, but not in excitable conditions. It does not derange digestion — *Med. and Surg. Rep.*, Jan. 19, 1884.

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ARTIFICIAL UREA AS A SUBSTITUTE FOR QUININE.—The *Jour. d'Hygiène* reports that Dr. Belvousoff, of Charkow, Russia, has used artificial urea (carbamide) as a remedy for intermittent fever in place of quinine. It is almost tasteless, and does not depress the nervous system. In Southern Russia, the peasants have used urine as a febrifuge for centuries; this has suggested the rational use of urea.—*Med. and Surg. Rep.*, Jan. 12, 1884.

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SALICYLAGE.—This is the term applied to the practice resorted to in Paris of using salicylic acid as a preservative of food and drinks. The question of its injurious effects was recently referred by the government to Prof. Brouardel, who reports as follows: 1. The daily use of even the smallest dose of salicylic acid is unsafe, its innocuity not having been as yet demonstrated. 2. It is certainly dangerous for the subjects of lesions of the kidneys or of the liver from old age or by some degenerative process. 3. The prohibition of salicylage should be strictly maintained.—*Med. and Surg. Rep.*, Jan. 19, 1884.

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PILOCARPINE.—Dr. James Murphy considers the use of pilocarpine, on account of its diuretic and diaphoretic properties, a valuable adjuvant in the treatment of puerperal eclampsia, as it reduces arterial tension at once, and gives our other remedies time to act. He reports two cases, in which it acted very favorably, in the "*Am. Jour. Obstetrics*," Dec., 1883. He used it hypodermically in doses of  $\frac{1}{4}$  of a grain.—*Med. and Surg. Rep.*, Jan. 12.

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VERBASCUM THAPSUS.—Dr. F. J. B. Quinlan ("*Brit. Med. Jour.*," Dec. 8, 1883) reports a case of pre-tubercular phthisis in which the patient gained twelve pounds in weight in one month under the use of mullein. He considers that it possesses all the advantages and none of the drawbacks of cod liver oil. (See also "*Amer. Jour. Phar.*," 1883, pp. 267 and 580.)



CONVALLARIA MAJALIS.—Dr. W. S. Gottheil, House Physician of Charity Hospital, New York, contributes to the "Therapeutic Gazette" for January, 1884, a detailed account of his use of convallaria majalis in fifteen cases, comprising organic heart disease, cardiac failure in acute rheumatism, hemorrhages or phthisis, and one case of Bright's disease. The results would seem to justify a thorough trial at the hands of the profession of this proposed substitute for digitalis. It possesses the very important negative property of producing no cumulative effect, a desideratum which has been long felt by the profession.

EXAMINATION OF FATS. By K. Zulkowsky.—Gröger's modification ("Dingl. polyt. J.," 1882 [244], 303, and [246], 286) of Haussmann's method (*ibid.* [240], 62) of testing fats depends on the fact that fatty acids are at once saponified by alcoholic potash, whereas neutral fats are only saponified on boiling.

Phenolphthaleïn is added to an alcoholic solution of the fat, and standard alcoholic potash dropped in until the red coloration disappears. Excess of standard potash is then added, the mixture boiled for half an hour, and the excess of alkali determined volumetrically. In this way the amount of fatty acids and of neutral fats is ascertained.

The author points out that the quantity of fat saponified by a litre of the normal alkali gives a clue to the nature of the fat, and would for example distinguish between artificial and natural butter.

The amount of glycerol in fats can be estimated in this way, each cc. of normal alkali required to saponify the neutral fat corresponding with 0.030667 gram of glycerol.

If the fat is dry and pure, then the weight of neutral fat  $F - G$  [ $G = (0.012667v)$ ] = the amount of fatty acids, when  $v$  = the cc. of standard potash used.

The molecular weight of the fatty acid can also be ascertained.—*Jour. Chem. Soc.*, Oct., 1883; *Ber.*, 16, 1140.

FETID AND SWEATING FEET—Dr. A. M. Vail ("Jour. Am. Med. Ass.," Nov. 3, 1883) says that he has never known the following to fail:

R	Aluminii et ammon sulph. exsic.....	grs. 2
	Acidi boracici.....	grs. 2
	Aque rosæ.....	grs. 35

M. Sig.—Apply with soft sponge without rubbing, just as soon as the shoes and stockings are removed, while the feet are yet moist. This is quite necessary, as also the care not to rub.

Let this be repeated every two or three days, in the evening.

DISTILLATION OF WINE. By S. Kitiesan.—The author having repeated Liebermann's experiments ("Ber." [15], 154, 438, 2554) on the distillation of wine, finds that the distillate contains ammonia and formic acid, and that the precipitate produced on addition of silver nitrate contains organic silver salts; Wartha's method ("Ber." [15], 437) for detecting sulphurous acid in wines is therefore untrustworthy. Old wines contain from 0.0057—0.034 per cent. of ammonia.—*Jour. Chem. Soc.*, Oct., 1883; *Ber.*, 16, 1189.

## MINUTES OF THE COLLEGE.

PHILADELPHIA, December 31, 1883.

A stated meeting of the Philadelphia College of Pharmacy was held on the 31st day of December, at the College Hall, No. 145 North Tenth street. Dillwyn Parrish, President, in the chair. Sixteen members in attendance.

The minutes of the semi-annual meeting were read, and, on motion, adopted.

Thomas S. Wiegand, in the absence of the Secretary of the Board of Trustees, read the minutes of the Board since the semi-annual meeting of College in September last, which were, on motion, adopted.

Wm. B. Thompson referred to the matter of preliminary education, which had, at the last meeting of the College, been referred to the Board of Trustees for their consideration, and after discussing the subject, hoped the matter would not be passed over without a full consideration of its merits.

Mr. Blair was of the opinion that students should not be admitted to the Junior Class until they could pass an examination before a committee appointed for the purpose, and not before they had been in the drug business at least two years.

Prof. Maisch took a different view of the matter in relation to excluding students from the lectures until they had served at the business for two years, preferring that a rigid junior examination be held as at present, before admission to the Senior Course.

Mr. Bullock stated that the Committee of Instruction, to whom the matter had been referred by the Board of Trustees, had found much difficulty in ascertaining the views of members on the subject, and hoped that some plan would be adopted for that purpose.

Professor Sadtler suggested that the advocates of the various phases of the question, present their arguments *pro* and *con* in answer to queries, which might be sent out to the members by the Committee of Instruction appointed by the Board of Trustees, and in furtherance of his views offered the following resolution, which was, on motion, adopted.

"*Resolved*, That the College requests the Board of Trustees, through its Committee on Instruction, to prepare and send to all the active members of the College a set of queries as to the desirableness of a preliminary examination on the part of students desiring to enter the College; as to what this preliminary examination should cover, and as to how it should be conducted, and on other matters connected with this subject."

Professor Maisch announced the death of John Eliot Howard, of Tottenham, England, an honorary member of this College, and alluded in fitting terms to his great services as a guinologist. An obituary notice of him will be found in the January number of this Journal for 1884, page 57.

Charles Bullock, on behalf of the Committee on Deceased Members, announced the death of Samuel W. James, an active member of the College, which event occurred about two months ago. Mr. James was a zealous member of the College many years ago, when its building was in Zane street, acting as librarian, and otherwise serving its interests. He resided in Bustleton, Philadelphia county.

Then, on motion, adjourned.

WILLIAM J. JENKS, *Secretary*.

## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, January 15, 1884.

In the absence of the President, Dr. A. W. Miller was called to the chair. The minutes of the last meeting were read and approved.

Professor Maisch presented to the cabinet two samples of *Cotton seeds*, sent by Mr. Hiland Flowers, of Louisiana; the varieties are known as golden prolific, and silk cotton. Also a specimen of the bark of *Eucalyptus globulus*, which was sent to him some time ago by Mr. J. J. Brown, of California; the specimen is very interesting, as there is evidently a disease which causes a secretion of kino-like substance. Likewise a root called *Cinnamon root*, which is used in Europe for the purpose of adulterating powdered cinnamon; the root has a flavor of cinnamon and cloves. This called out a statement from the Chairman that *Clove stems*, when reduced to powder, are used to mix with powdered cloves, and that in our neighboring city of Camden there was a factory for roasting and grinding coconut shells, which material is used for adulterating spices, and as it sells at 2½ cents per pound, it enables the fraudulent operator to dilute the spices with large profits.

Mr. J. W. England read a paper upon "*Medicated Waters*;" the reading of the paper brought out a discussion upon the varieties of oil of neroli, and it was said that while oil of petit grain is sometimes used, the true oil of neroli was obtained from the flowers, the best being known as *pétale bigarade*, and obtained from the flowers of the bitter orange, while that designated as *portugal* is made from the flowers of sweet orange, and is less fragrant.

Mr. H. C. C. Maisch read a short and interesting paper upon the "Steartopen of *Oil of Patchouly*."

Upon motion of Mr. Pile, the papers read were referred to the Publication Committee.

Professor Maisch read for Mr. G. W. Kennedy, a paper upon "*Oil of Sweet Birch*." The paper was particularly interesting, as it was accompanied with specimens of all the products of the different stages of the process.

Mr. Gustavus Pile read a paper upon the "Percentage and Specific Gravity of *Atcohol*."

Professor Maisch expressed his gratification at the labor which Mr. Pile had taken in the preparation of the tables submitted with his paper; it was, on motion of Mr. Newbold, referred to the Publication Committee.

Mr. H. C. C. Maisch read a paper upon the "Action of *Ammonium Chloride* upon *Lead Iodide*." The reaction was exhibited in the presence of the meeting, and it showed the error of the Pharmacopœia in stating that a colorless solution instead of a white magma would be the result. It was moved by Mr. England that the paper read be referred to the Publication Committee.

Dr. Miller read a paper from Prof. J. T. Rothrock giving some observations made with the microscope by students in the University of Pennsylvania, under the direction of Prof. Rothrock. The paper was accompanied by drawings, and will be published in the next number of the Journal.

It was moved that the thanks of the meeting be returned to the authors of the various papers, and that the Secretary record such a resolution.

On motion, adjourned.

THOS. S. WIEGAND, *Registrar.*

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## PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

CALIFORNIA PHARMACEUTICAL SOCIETY.—The regular quarterly meeting was held at the College Hall, Dec. 13th, President King in the chair. The meeting was well attended. Five new members were elected.

Papers were read by Messrs. McDonnell, Sommer, Barbet and Keil.

Mr. Runyon exhibited Dr. Squibb's apparatus stand, also Berry's pressure percolator, and a Franciscus gelatin pill-coating machine, which had been presented to the College. Mr. Lengfeld exhibited several rare chemicals and drugs. Mr. Searby exhibited the seeds of *Rheum Palmatum*, obtained from St. Petersburg, in Russia, specimens of which he had given to parties with a view to determine the most favorable locality for their cultivation. He also read to the members a letter received from Mr. J. W. Colcord, of Lynn, Mass., Secretary National Retail Druggists' Association, which contained many good suggestions, heartily endorsed by the members.

Mr. Lengfeld gave notice that at the next meeting he would propose some alteration and amendment to the constitution and by-laws, relative to having monthly meetings instead of the quarterly.

The meeting adjourned at 10.40 P.M.

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## EDITORIAL DEPARTMENT.

THE SOLUBILITY OF ESSENTIAL OILS IN WATER.—Mr. England's paper on Medicated Waters, which is published in the present number, raises again the question as to the best means for rendering volatile oils soluble in water, or rather for completely saturating water with volatile oils, without introducing objectionable chemicals into the solution. It is well known that these principles are but sparingly soluble, and that they differ in their solubility, those consisting entirely or mainly of hydrocarbons being, as a rule, less soluble than those consisting of oxygenated compounds. Yet the solubility in water has been accurately determined in very few, if any, instances. But it is known that if the volatile oils be finely divided before they are brought in contact with water, they will, like sparingly soluble salts, saturate the menstruum in a shorter time than if added in bulk, the criterion in this case being the odor and taste.

The division is sometimes effected by dissolving the volatile oil in a small quantity of alcohol and adding this solution gradually and with continued shaking to the requisite quantity of water; and where the small amount of alcohol thus introduced is not objectionable, this process is a useful and expeditious one; but the water is usually more or less opalescent or milky and cannot be obtained clear by filtration through paper, owing



to finely divided oil held in suspension. Clear and transparent medicated waters are at once obtained, if the volatile oils be first triturated with a somewhat absorbent powder before the water is added.

Most of the substances which have been recommended for this purpose are mentioned in Mr. England's paper, where also their value for this purpose is discussed. No doubt, calcium phosphate is a better material for this purpose than magnesia or magnesium carbonate, owing to the insolubility of the former salt in water, and the slow action upon it of large quantities of cold or even hot water. But it seems to us that a process which was recommended ten years ago (*Amer. Jour. Pharm.*, 1873, p. 564) has not received the attention it deserves, namely, the so-called "hot-water process." Mr. G. C. Percival, of Waterville, Me., showed that volatile oils dissolve in hot water to a much larger extent than in cold water, the excess separating again on cooling and removable in the usual manner. This process was subsequently recommended by E. Plummer, T. Everhart, and W. W. Trout (*Ibid.*, 1875, p. 342, 1877, p. 4), and will doubtless be found serviceable in many cases. But since the composition and solubility of volatile oils differ considerably, it is more than probable that one and the same process may not yield equally satisfactory results with all volatile oils.

This belief is strengthened by a communication received from a correspondent in New Zealand who desires from our contributors information as to the best method for rendering soluble such essential oils as peppermint, cloves, anise, sassafras, gaultheria, etc., and who further states that he has succeeded with oil of lemon and of ginger by using chloride of calcium and phosphate of sodium, but that the same process is not successful with the essential oils enumerated before. Our correspondent does not give the *modus operandi* for preparing the solution; but a glance at the volatile oils mentioned will show that the different behavior is most likely due to difference in composition. We invite our readers who have experience with one or more of these volatile oils to communicate their experience to the JOURNAL.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

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*Year Book of Pharmacy*, comprising abstracts of papers relating to Pharmacy, Materia Medica and Chemistry, contributed to British and foreign journals, from July 1, 1882 to June 30, 1883, with the Transactions of the British Pharmaceutical Conference at the twentieth annual meeting, held at Southport, September, 1883. London: J. and A. Churchill. 8vo, pp. 614.

This valuable publication has promptly made its appearance considerably in advance of the similar preparation issued in this country. As usual the abstracts which have been made with accustomed care, are classified under "Chemistry, Materia Medica and Pharmacy," and "Notes and Formule." They take up about one-half of the book, the balance being devoted to list of members, minutes of the last meeting of the Conference and the papers read at that meeting. We are pleased to note the prosperous condition of

the Conference, and the interest taken by its members, which is shown by the carefully prepared papers and by the discussions on topics in accord with the objects of the organization.

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*The Extra Pharmacopœia of Unofficial Drugs and Chemical and Pharmaceutical Preparations.* By Wm. Martindale, F.C.S., late Examiner of the Pharmaceutical Society and late Teacher of Pharmacy and Demonstrator of Materia Medica at University College. With references to their use abstracted from the medical journals and a Therapeutic Index of Diseases and Symptoms. By W. Wynn Westcott, M.B. Lond., Deputy Coroner for Central Middlesex. Second Edition. London: H. K. Lewis, 1884. 16mo, pp. 330.

As the title indicates, this little work is intended as a supplement to the British Pharmacopœia. Considering that this standard was published in 1867, and that since that time only a few formulas have been added by the general Council, under whose authority the Pharmacopœia is issued, it is evident that such a supplement must have been very much needed. That such was the case was shown by the exhaustion of the first edition within a few weeks. The second edition now before us is enlarged by the addition of a number of new drugs, chemicals, formulas, and references to therapeutic uses, and of a therapeutic index.

The drugs and chemicals are given in the alphabetical order of their Latin names. In a few cases incorrect old names have been retained, though their recognized correct titles are given as synonyms, and this fact is pointed out in the text. Thus chrysarobin appears in the list as "*Acidum chrysophanicum*," and butylehloral hydrate as "*Crotonchloral hydras*." The alkaloid "*caffaina*" is mentioned a second time as "*theine*," under its English title like the alkaloid theobromine. Drugs and chemicals recognized by the British Pharmacopœia are introduced only in case new preparations of the same are given. With the exception of these pharmacopœial drugs, all are briefly described by their most prominent characters. Then follow formulas for the various galenical and extemporaneous preparations into which the drug enters, and finally, under the heading of "*References*," the uses which are made of the same with references to the works or journals where these applications have been described. From the fact that a number of eclectic preparations have been admitted by the author under their commercial incorrect names, though they have been properly characterized as the powdered extractive, etc., it would appear that these remedies are more employed in some parts of Great Britain than they are in some sections of the United States.

It will be seen from the foregoing that the "*Extra Pharmacopœia*" covers a good deal of ground interesting to the pharmacist and to the physician, and will be useful as a handy work of reference concerning the leading facts, established, or at least reported, of non-pharmacopœial drugs. Such always have been and will continue to be prescribed; but it is to be regretted, that in the place of definite chemicals and of mixtures of known composition, preparations are largely used, which are introduced under a chemical name, but of which little else is known. For this, however, the authors are not responsible, and they have selected of these only a limited

number, and have not withheld the results if unfavorable to the pretended virtues.

We cheerfully recommend the work as a very useful one, and state in conclusion that also a foolscap octavo edition of it is about to appear.

*Retail Druggists' Diary and Note-book.* Detroit: F. Stearns & Co. 4to.

*The Chemists' and Druggists' Diary*, 1884. London: 4to.

In addition to the diary, both publications contain much useful and interesting information.

*Formulas for Elixirs and other Pharmaceutical Preparations adopted by the Lancaster Pharmaceutical Association.* New York: P. W. Bedford. 1854. Pp. 12. (Reprint from the "Pharmaceutical Record.")

*The Future Supply of Drugs to the Public.* Two addresses. By Professor Attfield, F.R.S.

This pamphlet contains the two scholarly addresses delivered by Professor Attfield as President of the British Pharmaceutical Conference at the meetings of this body held in 1882 and 1883. The special title of the first is "The Relation of Pharmacy to the State," and of the second "The Relation of the State to Pharmacy." We have on a former occasion given a sketch of the author's argumentation, and now merely refer to the publication of the pamphlet containing both addresses.

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## OBITUARY.

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B. FALKENBERG, apothecary, died suddenly on the 25th of September, in New York city, at the age of 71 years. He was born December 31, 1812, at Betzendorf, Salzwedel, from which place he went to Magdeburg, where he learned the drug business. He afterward went to Giessen, where he studied chemistry under Liebig, and in 1846 received the degree of Doctor of Philosophy. After coming to America he, in 1859, established himself as apothecary in Philadelphia, S. E. cor. Ninth and South streets, where he carried on the business until his death.

Mr. Falkenberg was a member of the Philadelphia College of Pharmacy, having joined in 1872; he was highly respected and esteemed by all who were acquainted with him.

We have been informed of the death of the following graduates of the Philadelphia College of Pharmacy:

SAMUEL WALTER COURTNEY, Class 1881, died in Philadelphia, of consumption, Oct. 24th last, in the 24th year of his age.

THOMAS S. COLLINS, M. D., Class 1880, died at Blackwoodstown, N. J., Dec. 12, 1883, of consumption, aged 27 years.

ALONZO G. MACKENSON, Class 1878, died in Philadelphia, Jan. 8, 1884, of meningitis, at the age of 28 years.

# THE AMERICAN JOURNAL OF PHARMACY.

MARCH, 1884.

## LABORATORY CONTRIBUTIONS FROM THE COURSE PREPARATORY TO MEDICINE IN THE UNI- VERSITY OF PENNSYLVANIA.

BY PROF. J. T. ROTHROCK, M. D.

*Read at the Pharmaceutical Meeting, January 15, 1884.*

Mr. Thomas Ridgway Barker, in examining the ordinary liquorice root (*Glycyrrhiza glabra*) finds imbedded in parenchyma and in wood, bundles of bast fibres. These bundles have what may be called a bundle sheath in which are found crystals of calcium oxalate, shown to be such by the ordinary tests.

Figure 1 shows the bundle in the parenchyma, seen in cross section.

FIG. 1.

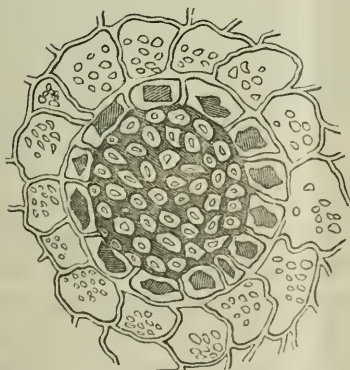


FIG. 2.



Figure 2 gives a longitudinal view of the same, divested of its surrounding parenchyma. Figures are magnified about 350 diameters.

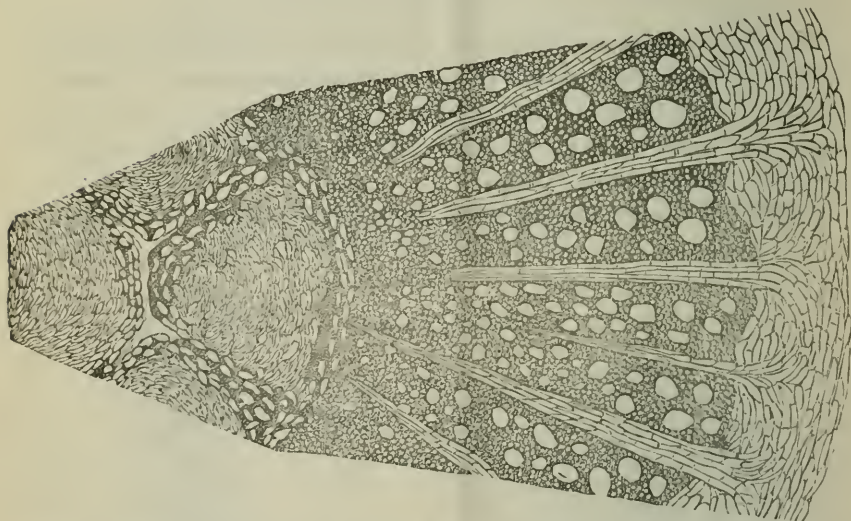
Such crystals and crystal sheaths are not unique. They are found in the *Aspidosperma Quebracho*, for which see the essay by Dr. Adolph Hansen, reprinted in the "Therapeutic Gazette," October, 1880, p. 292,



and are also found in the stem of the anomalous *Welwitschia mirabilis*, for a figure of which see "*De Bary Vergleichende Anatomie*," p. 140. There is, however, this difference between the liquorice root and the other plants, *i. e.* in the former several fibres are included in a single crystal sheath, while in the *quebracho* and *welwitschia* there is but a single fibre.

Mr. Jesse G. Shoemaker contributes two diagnostic characters in the stems and roots (say one-fourth of an inch in diameter) of *Gelsemium sempervirens*, which so far as seen are peculiar in their association,

FIG. 3.

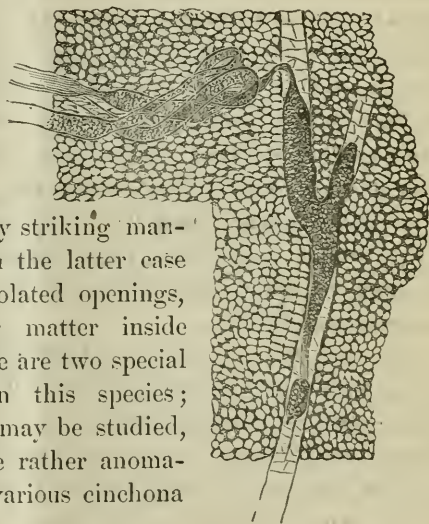


and which hence are of positive value. The first is derived from the medullary rays. These usually widen in a marked manner, going from the centre to the circumference, being *sometimes* much more than twice as broad exteriorly as interiorly. The second character is the tendency of the pith to be penetrated by several plates of large, thin-walled cells, which divide the pith more or less perfectly into four portions. This latter character, though as far as observed it varies considerably in the relations of the large cells and the ordinary pith cells, is always present and plainly enough marked to serve as a means of diagnosis. Tests upon this point have been made on both fresh and dry specimens received at different times from different places. Figure 3 illustrates these peculiarities, magnified about 400 diameters.

Mr. Charles W. Burr has detected starch in the roots of *Coptistrifolia*. In *Coptis Teeta*, Wallich, found in the Mishmi Mountains, eastward of Assam, and recognised by Flückiger and Hanbury as the officinal *coptis*, starch is known to be present; though in 1873 Mr. E. B. Gross failed to detect it in our American *Coptis trifolia*. Mr. Burr has repeatedly verified his observation on authentic specimens.

Mr. Wm. C. McFetridge, working upon the *Apocynum cannabinum*, succeeded in isolating very readily the laticiferous vessels. The illustration shows this quite clearly on longitudinal section. A transverse section shows the same tissue in a very striking manner, with this difference, that in the latter case the vessels are seen as oval, isolated openings, containing bodies of granular matter inside a very delicate cell wall. There are two special points about these vessels in this species; first the ease with which they may be studied, and second, their relation to the rather anomalous laticiferous vessels in the various cinchona barks.

FIG. 4.



## ANALYSIS OF THE LEAVES OF CEANOTHUS AMERICANUS, LINNE.

By J. H. M. CLINCH, PH.G.

*From an Inaugural Essay.*

Five grams of the air-dry leaves subjected to a heat of 100°C. until they ceased to lose weight, weighed 4.455 grams, showing a loss of .545 grams = 10.9 per cent. amount of moisture.

Forty grams of the air-dry leaves were incinerated and yielded 1.895 grams of ash = 5.31 per cent., of which 50.526 per cent. was soluble in water, 48.629 per cent. was soluble in hydrochloric acid, .8 per cent. was soluble in boiling sodic hydrate. An analysis showed the presence of potassium, calcium, magnesium, aluminium, iron and silica, combined as chlorides and sulphates in the aqueous solution, and as

phosphates, sulphates, and carbonates in the hydrochloric acid solution (the iron may have been derived from the mill during grinding).

Thirty grams of the powdered air-dry leaves were exhausted with pure benzol and the liquid allowed to evaporate spontaneously, yielding an extract weighing 1.507 grams = 5.64 per cent. This was treated with warm water, allowed to cool, filtered, and the filtrate tested for alkaloids and glucosides with negative results. The undissolved extract was treated with water acidulated with sulphuric acid, filtered, and the filtrate tested for alkaloids; gave a grayish precipitate with potassio-mercuric iodide, and a bright yellow precipitate with phosphomolybdic acid; negative results for glucosides. The residue was washed well with water to free from sulphuric acid, and treated with absolute alcohol; the solution was filtered, treated with animal charcoal, filtered again and evaporated, leaving a pale yellowish mass of a soft and tough consistence. It has an acid reaction, is soluble in ether, benzol, volatile oils, partly soluble in aqueous alkalies, soluble in strong sulphuric acid with a red color, and has a peculiar odor and somewhat acrid taste.

This appears to be a resin mixed with a small quantity of fixed oil, as the portion left on treatment with 80 per cent. alcohol, when boiled with potassa, was precipitated by chloride of sodium as a soap. The residue of the benzol extract after treatment with absolute alcohol consisted of wax with a small amount of coloring matter.

The drug exhausted with benzol was dried and exhausted with stronger alcohol, the extract which weighed 5.801 grams = 21.72 per cent. was treated with absolute alcohol and the soluble portion with distilled water. This solution had an acid reaction, and gave a yellow precipitate with subacetate of lead, which after decomposing with hydrosulphuric acid yielded a filtrate reducing Fehling's solution on heating, and gave a green color with ferric chloride, and a reddish brown color with solution of potassa, showing the presence of an "iron-greening" tannin. A concentrated solution failed to give precipitates with solutions of gelatin and tartrate of antimony and potassium, but gave precipitates with cinchonine and quinine, and reduced nitrate of silver in the specular form when heated. These reactions appear to indicate that it is identical with or closely related to caffetannic acid.

The filtrate from the precipitate by subacetate of lead was freed from lead by  $\text{H}_2\text{S}$  and concentrated. Phosphomolybdic acid and potassio-mercuric iodide failed to produce precipitates, but Fehling's solution



was reduced without heat (glucose). The remaining solution was evaporated to dryness; the residue had very little odor, and at first a sweet taste, passing into that of pop-corn, and was considered to be glucose and extractive matter.

The alcoholic extract insoluble in water gave with dilute sulphuric acid a filtrate in which phosphomolybdic acid and potassio-mercuric iodide gave precipitates the same as in acid solution of benzol extract, and negative results for glucosides.

The alcoholic extract insoluble in dilute sulphuric acid, was entirely soluble in dilute ammonic hydrate and reprecipitated by an acid; it was blackish brown, brittle, opaque, inodorous and tasteless, and in concentrated alcoholic solution had an acid reaction. It was partly soluble in boiling water, not wholly precipitated on cooling, and partly soluble in ether, the solution having a green color; it is an acid resin mixed with coloring matter, and in alcoholic solution gives a precipitate with lead acetate and a green color with ferric salts. That portion of the alcoholic extract which was insoluble in alcohol was found to consist of some coloring and extractive matter.

The leaves previously exhausted with benzol and alcohol, yielded to cold water 12.795 per cent. of extract containing gummy and coloring matter. A decoction of the leaves did not become blue with iodine. 8 pounds of the air-dry leaves distilled with water yielded about 10 grains of a light yellow oil having a strong aromatic odor and a distinct acid reaction.

The precipitates obtained with the benzol and with the alcohol extract by potassio-mercuric iodide were separately treated with stannous chloride and potassa; on exhausting with ether and evaporating, minute apparently crystalline residues were obtained which were not further examined.

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**Arbutin.**—Dr. Mensche (Centralbl. f. Klin. Med.) attributes to arbutin valuable diuretic properties, and states that it may be given in large doses without detriment, and that it is excreted in the urine as hydrokinone; it seems to be specially beneficial in vesical catarrh, and, in gonorrhœa may supersede the use of injections.

More than twenty years ago Dr. Carl D. Schroff experimented with arbutin, (Pharmacologie, p. 142), and giving it in doses of 0.1, 0.2 and 0.5 Gm. observed no special action from it; neither the quantity nor the color of the urine was altered, and arbutin could not be detected in the urine.



## XANTHIUM STRUMARIUM, LINNE.

BY MATTHEW VENABLE CHEATHAM, PH.G.

*Abstract from an Inaugural Essay.*

The cocklebur is one of the first plants making its appearance in the spring, and the hogs, which in some of the Southern and Western States are allowed to run at large during the fall and winter to eat the mast, are very fond of the young plant, but almost invariably die after eating them; warm lard and other fatty substances being used as antidotes with only poor success.

The writer extracted the bruised dried fruit, 195.21 grams, with benzin and obtained 29 grams of a yellowish, non-drying fixed oil having the specific gravity .900 and a peculiar odor somewhat resembling that of freshly extracted flaxseed oil; from the soap prepared with it, oleic acid was obtained, and glycerin was found in the mother liquor of the soap.

With strong alcohol a resinous extract was obtained. The portion soluble in diluted acetic acid gave precipitates with potassio-mercuric iodide, with iodine and with tannin, but not with picric acid; ferric chloride produced a green color, and sugar followed by a drop of sulphuric acid caused a yellowish color slowly changing to carmine and to bright violet red. Ether extracted from the acid solution the principle giving these reactions; but the small quantity subsequently taken up by ether from the same solution rendered alkaline by potassa, did not give these reactions.

Of the resinous substance left after treatment with acidulated water, 4 grams were given to a small dog, producing no visible effects. This substance was freely soluble in ether and alcohol and slightly soluble in potassa and ammonia; ferric chloride added to the alcoholic solution gave a deep green color probably due to a little tannin.

The principle obtained above, though probably not pure, the author thinks may be different from the xanthostrumarin of Zander (*"Amer. Jour. Phar.,"* 1881, p. 271), the latter being precipitated with picric acid and not precipitated with tannin.

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**Caution about Belladonna Plasters.**—Dr. Martin J. Fleming reports a case of well-marked belladonna poisoning, relieved by opium treatment, in the *Medical Record*, January 19, 1884, caused by the application of a plaster to a back that had been somewhat denuded by the use of an irritating liniment.

## TANNINS OF OAK-BARK.

BY C. ETTL.

The tannin of oak-bark exists in two forms, viz., as a tannic acid, which in the free state has a reddish white color, and as an anhydride of that acid, called *phlobaphene*, the color of which is brown-red. The distinction between these two bodies is familiar to tanners, who designate the anhydride simply as "coloring matter," and reject barks containing a large proportion of it, as it imparts too red a color to leather dyed with such barks.

The question as to the existence of a glucocide in oak-bark is now decided in the negative, as tannic acid extracted from the bark by ethyl acetate does not yield any such substance. The reactions which were supposed to indicate the presence of a glucoside were really due to lævulin, which, on treating the bark with dilute sulphuric acid, was converted into lævulose.

The tannic acid obtained by agitating an alcoholic extract of the bark with ethyl acetate may be contaminated with two substances, a brownish green amorphous terpene-resin and phlobaphene. The former may be separated by its ready solubility in ethyl acetate, ethyl oxide, and benzene. The phlobaphene is easily recognized by the brown-red precipitate which it gives with lead acetate.

Quercitannic acid cannot be extracted from the bark in the pure state by ethyl acetate, inasmuch as it decomposes that compound into alcohol and acetic acid almost as easily as sulphuric or hydrochloric acid, and the acetic acid thus set free dehydrates a portion of the tannic acid, producing phlobaphene. Pure quercitannic acid dissolves completely in ethyl acetate, and does not give up any foreign bodies to pure ethyl oxide or to benzene; its solution in very dilute alcohol gives with basic lead acetate a precipitate of pure yellow color.

Phlobaphene is nearly insoluble in water and in ether, but dissolves readily in alcohol of all strengths. As prepared from the bark, it may be contaminated with terpene-resin and pectin-substances. The former of these bodies may be recognized and separated by treatment with ether or benzene, which dissolve it; the pectin-substances by their insolubility in spirit of 90 per cent. The presence of tannic acid in the phlobaphene may be recognized by the fact that the latter, after

being freed from adhering moisture by drying at  $110^{\circ}$ , gives off a further quantity of water at  $130$ – $140^{\circ}$ .

Quercitannic acid is represented by the formula  $C_{17}H_{16}O_9$ . At  $130$ – $140^{\circ}$ , it gives off water, and is converted into the brown-red anhydride,  $C_{34}H_{30}O_{17} = 2C_{17}H_{16}O_9 - H_2O$ , identical with the phlobaphene contained in the bark. 1 mol. of this substance boiled with sulphuric or hydrochloric acid gives up 1 mol. water, and is converted into a second anhydride,  $C_{34}H_{28}O_{16}$ ; and by boiling the tannic acid free from anhydrides with either of these anhydrides, a third anhydride,  $C_{34}H_{26}O_{15}$ , is obtained. These three anhydrides are soluble in alcohol and in caustic alkalis.

Löwe ("Amer. Jour. Phar." 1881 p. 401, 1882 p. 118,) by treating quercitannic acid or phlobaphene with dilute sulphuric acid, or with oxalic acid, has obtained a fourth anhydride,  $C_{34}H_{24}O_{14} = 2C_{17}H_{16}O_9 - 4H_2O$ , which he designates as *oak-red*. The same name has been applied to the first anhydride by Oser, and to the second by Böttinger.

Another oak-bark examined by the author yielded a tannic acid having the composition  $C_{20}H_{20}O_9$ , and agreeing with the former in all its properties, excepting in its reaction with ferric chloride, with which it gives a bluish green color, quickly changing to deep green, and on addition of sodium carbonate, first to blue and then to red, whereas the quercitannic acid above described, and all its anhydrides, give with ferric chloride a black-blue precipitate. This tannic acid begins to lose water at  $124^{\circ}$ , melts at  $140^{\circ}$ , resolidifies on further loss of water, and is converted into a brown-red substance identical in composition with phlobaphene.

The tannic acid,  $C_{20}H_{20}O_9$ , also yields four anhydrides agreeing in character with those obtained from the acid  $C_{17}H_{16}O_9$ . These anhydrides are represented by the formulæ  $C_{40}H_{35}O_{17}$ ,  $C_{40}H_{36}O_{16}$ ,  $C_{40}H_{34}O_{15}$ , and  $C_{40}H_{32}O_{14}$ . The same tannic acid heated in a sealed tube with hydrochloric acid yielded a gas burning with a green flame, but smaller in quantity than that obtained from the acid  $C_{17}H_{16}O_9$ . Heated in a tube with dilute sulphuric acid, it gave a red liquid and a large quantity of undissolved anhydrides; and on agitating this liquid with ether a small quantity of crystals was obtained consisting of gallic acid.

The phlobaphene submitted to dry distillation, yielded pure catechol, free carbon, and an oil insoluble in potash, smelling like the terpenes and containing 72.46 per cent. C and 7.11 H. This oil, oxidized with

permanganate, yielded an amorphous resin, whence the author concludes that it is derived, not from the tannin, but from the terpenes mixed with the phlobaphene which was submitted to dry distillation.

For the theoretical considerations relating to the constitution of all the bodies above described, the original paper must be consulted.—*Jour. Chem. Soc.*, Nov., 1883; *Monatsh. Chem.*, iv. 512-530.

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## ON POMEGRANATE BARK.

BY WILLIAM F. JUNGKUNZ, PH.G.

*Abstract from an Inaugural Essay.*

The commercial bark on drying in an air-bath, lost 10 per cent. of moisture; 10 troyounces of it exhausted with benzin left a wax-like extract weighing 1 gram; it was free from alkaloid, yielded to alcohol a small quantity of a greenish yellow matter and contained a little fat and wax.

A tincture made from 12 troyounces of the bark with alcohol and concentrating, on standing deposited crystals of mannit. The percolate also contained a little resin, considerable tannin, but no gallic acid, and yielded a small quantity of a light amber colored oily liquid, which was soluble in water, alcohol, chloroform and ether, and gave precipitates with ferrous sulphate, cupric sulphate, plumbic acetate, mercuric chloride and with several group reagents for alkaloids.

For preparing a larger quantity of the alkaloid 60 troyounces of the ground drug were mixed with about an equal weight of milk of lime and percolated with water; the reddish brown liquid was concentrated on a water-bath, exhausted with chloroform and this solvent evaporated; 3.63 grams of impure alkaloid were thus obtained. It was dissolved in alcohol, the solution digested with animal charcoal and the filtrate evaporated; the color was scarcely changed, but considerable of the alkaloid had been lost.

The decoction of the bark contained pectin and mucilaginous compounds, and on incineration the bark yielded 19.61 per cent. of ash, of which 24.36 per cent. was soluble in water, the remainder dissolving in hydrochloric acid leaving a small amount of silica behind. The ash consisted of chlorides, carbonates, phosphates, and sulphates of sodium, potassium, calcium, iron and aluminium. The alkaloid evidently exists in the form of a tannate in the bark.



AQUEOUS MIXTURES CONTAINING POWDERED  
CHLORATE OF POTASH.

BY JOHN RUTHERFORD HILL, Pharmaceutical Chemist.

*Read before the North British Branch of the Pharmaceutical Society,  
Edinburgh, January 16, 1884.*

It is a common practice to prescribe gargles, mouth washes and mixtures containing a much larger proportion of chlorate of potash than the aqueous menstruum is capable of dissolving, and the object of the following note is to point out some objections to this practice, and to suggest a more excellent way.

It not unfrequently happens that such gargles, etc., are ordered to be made with boiling water, but no discreet dispenser would be so foolish as to follow the directions of the prescriber in such a case, because, although the whole of the chlorate might thereby be dissolved, it would, of course, be deposited in a crystalline form as the solution cooled.

It sometimes happens, however, that the proportion of chlorate is very near the quantity which the menstruum is understood to be capable of holding in solution at the normal temperature; and in such cases, I believe, many dispensers do not hesitate to facilitate solution by the application of heat. Even in these instances there is always a risk that separation of crystals may ensue, either from an erroneous calculation as to the degree of solubility, or from the normal temperature falling considerably below that at which the solubility estimations were made, and consequently this process is not altogether free from objection.

The least objectionable method is generally understood to be that of reducing the chlorate of potash to very fine powder, using in all cases cold water only and attaching a "shake the bottle" label.

If the chlorate remained in the condition of fine powder this might meet the first difficulty, because, though not in solution, it would be in the next best condition for application to inflamed and ulcerated surfaces. Unfortunately, however, this is not the case, and chlorate of potash gargles, etc., so dispensed soon become unfit for use, owing to the rapidity with which finely powdered chlorate resumes the crystalline condition.

My attention had been frequently directed to this circumstance by

observing that when such gargles, etc., had to be repeated there were very often present, in the bottle which had previously contained them, a few pretty large crystals of chlorate of potash. A short time since the subject was again brought very forcibly under my notice in the following manner.

About twelve months ago I dispensed a gargle containing  $\mathfrak{z}\text{iv}$  chlorate of potash in eight ounces of water. About one half had been used at the time and the remainder set aside until about two months ago, at which time circumstances arose calling for the use of a similar remedy. The half empty bottle was brought to me to see if the same gargle would be suitable for this case, and I found that the whole of the undissolved chlorate of potash had, in the interval, passed from a condition of fine powder to that of pretty large tabular crystals, and the gargle was therefore in a state quite unfit for use.

It occurred to me that it might be possible to prevent the chlorate resuming the crystalline form, at least for a reasonable length of time, by adding to the gargle some substance likely to interfere with crystallization. To determine this point the following mixtures were prepared:

No. 1. Chlorate of potash  $\mathfrak{z}\text{j}$ . water to  $\mathfrak{z}\text{j}$ .

No. 2. Chlorate of potash  $\mathfrak{z}\text{j}$ . glycerin  $\mathfrak{z}\text{j}$ . water to  $\mathfrak{z}\text{j}$ .

No. 3. Chlorate of potash  $\mathfrak{z}\text{j}$ . simple syrup  $\mathfrak{z}\text{ij}$ . water to  $\mathfrak{z}\text{j}$ .

No. 4. Chlorate of potash  $\mathfrak{z}\text{j}$ . gum arabic gr. x. water to  $\mathfrak{z}\text{j}$ .

No. 5. Chlorate of potash  $\mathfrak{z}\text{j}$ . gum tragacanth gr.  $\text{ijj}$ . water to  $\mathfrak{z}\text{j}$ .

No. 6. Chlorate of potash  $\mathfrak{z}\text{j}$ . honey  $\mathfrak{z}\text{j}$ . water to  $\mathfrak{z}\text{j}$ .

No. 7. Chlorate of potash  $\mathfrak{z}\text{j}$ . treacle  $\mathfrak{z}\text{j}$ . water to  $\mathfrak{z}\text{j}$ .

The chlorate of potash was in each case reduced to very fine powder, and the mixtures were all equally exposed to the variable temperature of an ordinary sitting-room.

On examining the specimens about twenty-four hours after they had been so exposed I found that in every one of them a portion of the chlorate had passed into the condition of very thin, sharp-edged tabular crystals, exhibiting in many cases iridescent properties of thin transparent plates. The time of examination was on the morning of the second day when the temperature of the room was several degrees less than it had been in the course of the previous night; a circumstance which, I believe, has a good deal to do with the rapid change of the chlorate from a state of fine powder to that of sharp crystals.

When the temperature of the room rises a quantity of the chlorate

passes into solution and is deposited in the crystalline condition as soon as the temperature falls. This accounts for the change so far as a portion of the chlorate is concerned, but does not explain how the whole becomes ultimately so altered. This, I think, is brought about in the following manner. When the temperature rises a portion of the chlorate dissolves and when the temperature falls it is deposited as crystals. On the temperature again rising a fresh portion of the powdered chlorate is dissolved, because the powder dissolves more readily than the crystals, and this second portion is in turn deposited, either as a fresh crop of crystals, or, more probably, as an addition to those already formed. In this way, with each day's variations in temperature, the process goes on until, as already stated, the whole of the chlorate takes the form of pretty large tabular crystals.

The theory that this change is at least very much accelerated by the variable temperature of an ordinary bedroom or sitting-room was confirmed in the following manner. A mixture containing one drachm of finely powdered chlorate in one ounce of water was kept for a month in a place where the temperature did not vary more than two or three degrees. At the end of that time it was found that the chlorate had passed into a state of small, somewhat granular crystals, showing only a slight tendency to form crystalline plates. In this condition, I believe, it would be less objectionable for use as a gargle than in the other case where a number of sharp-edged plates were formed; but, nevertheless, it appears that, even under the most favorable conditions, it is impossible to retain chlorate of potash in a state of fine powder in presence of water.

From what has been stated it will be apparent that none of the substances employed had the effect of preventing crystallization, and that a single day's exposure to the variable temperature of a sitting-room was sufficient to produce such an alteration of the chlorate as to render the gargle, etc., unfit for use. Treacle, tragacanth and honey seemed to have a slight influence in retarding the process of crystallization; the crystals formed in these mixtures being of somewhat smaller size. They failed, however, to accomplish the object in view, which was not simply retardation but prevention. Thus, then, we have shown that the practice of prescribing such mixtures is open to a serious objection; but there is still another clause to the indictment.

Such gargles or mixtures are frequently directed to be taken in regular specified quantities; the intention being that each quantity

should contain a definite dose of chlorate. In the case of a heavy salt like chlorate of potash, however, subsidence takes place so rapidly that, even though the bottle be vigorously shaken immediately before measuring out a dose, it is practically impossible to obtain a reasonable approach to uniformity, and, therefore, the intention of the prescriber cannot be attained.

The practice to which this note is meant to call attention is then, to say the least of it, shown to be undesirable; I believe it to be also unnecessary.

It is the province of the pharmacist to carry out, with strict fidelity, the directions of the physician, and he may not presume to dictate. While this is so, however, we believe that it is not only his province but his duty to draw attention to defects in prevailing methods and to devise improvements.

Believing this to be so, I venture to suggest that the practice referred to might be advantageously departed from, and that chlorate of potash for such purposes should always be prescribed in the form of powders. The patient could be directed to add the requisite quantity of water at the time of using; there would be no risk from crystallization, and the dose would be uniform. By this means both difficulties would be completely disposed of, and it would be, in every respect, a more excellent way.—*Phar. Jour. and Trans.*, Jan. 26, p. 594.

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## SOAP MANUFACTURE AND THE SOAP OF COMMERCE.

BY ALFRED SMETHAM, F.C.S.

In a paper read before the Liverpool Chemists' Association, Nov. 8th, 1883, the author first briefly described the raw materials employed by the soap maker, and then proceeded to the processes adopted for their conversion into soap. The boiler first supplies himself with a weak solution of caustic and then melts in a pan a quantity of the fat to be operated upon. The specific gravity of the lye—as the solution of alkali is called—should not in the first instance exceed 1·050–1·060. The heat is maintained by means of steam, the direct use of a fire being now practically obsolete. The first action of the caustic is to produce an emulsion, and when this is properly formed more alkali is added, the strength of the lye being gradually increased. The reason why a weak lye must be used in the first instance is that soap is insol-



uble in a strong solution of caustic, and the particles of fat would, by the use of a strong lye, become encased in an insoluble layer of soap, which would prevent further action from taking place. The lye is added in until an excess of caustic is found in the pan. More oil or fat, or, where required, rosin is then added; and the fat or rosin saturated by subsequent additions of lye. When the operator, by examining the texture of the soap, considers the reaction complete, the watery solution of soap and glycerin is decomposed by the addition of salt, in a solution of which soap is insoluble. The soap then rises to the surface in a finely divided state, and after complete separation the spent lye is removed. After the removal of the lye the soap is again heated, and, if necessary, some weak lye added, so that the soap may assume a "close" texture, as it is called. When this is complete the soap is removed, usually by pumping, to another vessel, where it is "crutched." This consists essentially in stirring the mass by rotating arms moved by machinery, by which means the soap is brought into condition, and if of too great consistency more water is added. It is now ready for the frames, composed of slabs of wood or iron placed together in a rectangular form, and made in such a manner that when the soap has solidified the sides may be removed. The soap is left in the frames until it is completely set. When this has occurred, the block is taken out and cut into slabs by means of a wire pulled through it in a horizontal direction. The slabs thus formed are placed upon a table with a movable arm, across which wires are stretched, and the slabs are by this means again divided into bars. It is then, if it be a pure soap, ready for packing. Sometimes, however, it is desired to make up the soap in tablets of given weight. It is then cut up into pieces of the requisite weight and stamped in a press with dyes, the presses usually being worked by hand.

This, then, is a brief outline of the manufacture of a genuine soap; but the exigencies of the case render it necessary to produce a variety of soaps, at cheap prices. This has been brought about by competition and the inability of the public to discriminate between a well-made and a common soap, and consequently it is impossible for any firm manufacturing only pure soaps of high quality to hold its place in the struggle for existence. The cheaper soaps, being more readily soluble in water, produce a lather more quickly than a pure soap, and as the public does not as a rule make comparative trials as to the lasting powers, and is almost invariably led away by a cheap article, the sale

of the best soaps has of late fallen off considerably, and the cheaper kinds have taken their place.

Although I have used the term pure soap to represent a soap manufactured from fat and alkali alone, it would be unfair to designate the common soaps adulterated, as we shall see on considering their nature.

A pure tallow soap will only take a certain proportion of water; and it becomes necessary to mix other substances with it if the percentage of water is increased. A substance which is useful in this respect, and which at the same time has detergent properties, is silicate of soda. This is the substance known as soluble glass, but it is usually sold to the soap boiler in solution. It is composed of silicic acid and soda, in various proportions, and is formed of two kinds, the neutral and the caustic. The neutral has a specific gravity of about 1.370, and contains about 65 per cent. of water. The proportion of silicic acid is about 26 per cent., and the remainder is soda and impurities. The caustic silicate is a much heavier solution, and has a specific gravity of about 1.700. It contains about 43 per cent. of water, 33 per cent. of silicic acid and the remainder alkali and impurities.

These solutions are either used alone, or in combination, and are added to the soap before finishing. It is necessary to "crutch" well to insure the complete mixing, and the crutching should be continued until the soap is about to set. The silicated soaps generally contain a larger proportion of water than pure soaps, besides the actual weight of silicate, and they can, therefore, be produced at lower prices. The detergent power of these soaps is greater than would be indicated by the pure soap contained in them, and in many districts this variety finds a market more readily than the better qualities. I should here point out that the value of a soap is not altogether determined by the composition. A pure soap may be produced from a discolored tallow or oil, which as a rule injures the appearance and causes it to command a less value in the market.

A form of silicated soap which obtains a large sale is the mottled. This differs essentially from the mottled soap manufactured a few years back, which was pure and necessarily of a high standard. It is usually manufactured from bleached palm oil, or from palm nut oil or cocoa nut oil as the chief ingredient. It is usually run with silicate to a considerable extent and contains a variable amount of fatty acids—the quantity depending on the quality it is desired to make. The mottling

is produced generally by the addition of ultramarine, which gives to the soap a bright appearance.

Some samples, sold at low prices, have come under my notice which have not only been run with silicate but contain from 6 to 8 per cent. of common salt and not more than one quarter of their weight of fatty acids. The salt is of no value as a detergent agent, and must be looked upon simply as a "make weight." It is only with soaps made from palm nut and cocoa nut oil that the salt will combine properly. The peculiar behavior of these two soaps in salt water renders them valuable for marine purposes. Very considerable experience is required in making a soap of low quality which shall be firm to the touch and present the appearances of a good soap, and the difficulty is increased in the case of common mottled soap, where it is necessary to have the mottling equally distributed throughout the mass. The methods by which this is attained are kept, as a rule, as trade secrets, but no great difficulty is experienced when the matter is approached on scientific principles.

In the common soaps which are usually used for scouring, etc., the proportion of soda in excess of the fatty acids may be greater than in those used for finer purposes or for toilet use. The choice of the fat must also be regulated by the purposes to which the soap is intended to be put.

The details of the manufacture require careful attention, and can only be mastered after long experience, but it is necessary that all the processes should be carried on in the lines I have indicated. The peculiar behavior of each kind of soap would occupy more time than is at my disposal, nor would it serve to elucidate the processes; but it is important that the manufacturer should be conversant with their properties. As a rule, the larger the amount of stearin or palmitin there is in the fat operated upon the harder will be the soap.

Before closing the remarks upon the manufacture I may just refer to two methods which are occasionally resorted to, to improve the appearance of common soaps. The first of these consists in placing the soap in an oven or stove, so that it may become surface dried and present a hard "skin." The second of these consists in dipping the soap in a strong solution of brine or other liquid. The salt has a great affinity for water and removes it from the surface of the soap, but the soap itself is quite insoluble. This process improves the



the appearance considerably, and prevents the soap having a sticky consistency on the exterior of the bar.

In treating of the second part of my subject, it may be well to preface my remarks with a brief account of the methods by which I have arrived at the results which I propose to state, as showing the quality of the soaps found in the market. I have now in my possession upwards of three hundred analyses of soap from different sources, which have been submitted to me at various times. In analyzing these I have found the following processes the most convenient and accurate.

The water is determined by drying in an air-bath a weighed portion of the soap at a temperature of  $120^{\circ}\text{C}$ . At this temperature the soap swells up and the water is soon expelled without any loss of the fatty matters or danger of losing the substance. The weight is taken after about three hours, and subsequent weights are made at intervals of about an hour until the weight is constant.

To obtain the percentage of fatty acids I find it best to weigh out about 3 grams of the soap in a porcelain or platinum basin, including in the weight of the basin a small stirring rod about 3 inches long. The soap is then dissolved in a small quantity of water in the basin, and when *completely* dissolved, about 5 cc. of dilute sulphuric acid are added. This decomposes the soap, setting free the fatty acids and forming sulphate of soda. The solution is then gently warmed—preferably on a water-bath—until the whole of the fatty acids have risen. It is then allowed to cool, and the fatty matter will usually form a solid cake. If this does not occur a weighed quantity of purified wax must be added and the whole re-melted. When the cake is formed it is simply moved a little from the side, and the liquid from below, which should contain no fat, is poured off. The cake is re-melted with distilled water and allowed to settle as before. This is continued until the washings are free from acid. The cake is then melted in a water oven and again allowed to cool, and the water which still adheres is removed by gently touching with filter paper, and the basin is again placed in the water oven and weighed until the weight is constant. From the figures obtained the percentage of fatty and resinous acids is calculated.

The soda is determined by adding to the filtered solution from a given weight of soap an excess of standard acid and titrating back the excess of acid by means of standard alkali, using cochineal as indicator.



The percentage of silicate is obtained from the silicic acid found. To obtain this I prefer to ignite about 2 grams of the soap in a platinum dish until the volatile matters are dispersed. After cooling, the ash is covered with a glass and treated with an excess of hydrochloric acid. It is then evaporated to dryness, taken up with dilute acid, well washed and then ignited and weighed.

These are the constituents which it is usually necessary to determine, but it is sometimes required to make a more complete analysis. When this is desired it is a good plan to dissolve the soap in alcohol and filter. By this means most of the adulterating materials are separated. The chlorine is best estimated after decomposing the soap with nitric acid and allowing the fat to solidify, as in the estimation of fatty acids, by precipitating with nitrate of silver and weighing the resulting chloride.

The percentage of free alkali is important. It can be obtained by precipitating the clear alcoholic solution with carbonic acid, but I prefer to titrate the solution with standard acid, using phenolphthalein as indicator. The results are good.

In making out the analysis of a soap it must be remembered that the fatty constituents actually exist as fatty anhydrides and not as fatty acids, and if, therefore, we determine the whole of the constituents of a soap and include the fatty matters as the estimated acids we shall find that the figures will add up to about 103 per cent. This is due to the absorption of water by the fatty anhydrides in decomposition. The actual percentage of fatty acids should always be placed as a foot note.

In making a choice of the soaps usually found in the market is difficult to know which to take as representative, but it will, perhaps, be sufficient to divide them into two classes, the pure and the silicated. The analyses given of the average qualities of these soaps show the following:

Soaps.	Fatty Acids.		Soda.		Hydrated Silicate of Soda.		Water.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
Pure.....	63.18	53.74	8.31	6.38	.....	.....	28.13	36.89
Silicated.....	56.91	26.26	7.45	5.30	8.58	1.04	31.41	58.97

## THE OCCURRENCE OF SUGAR IN TOBACCO.

BY PROFESSOR ATTFIELD, F.R.S.

About a year ago the following questions were put to me, "Does tobacco contain sugar or any similar saccharoid matter? if so, how much?" The subject not previously having come before me I could not definitely reply. Indeed, a search through the literature of tobacco showed that the questions could not satisfactorily be answered at all in the existing state of our knowledge. I therefore proceeded to obtain evidence on the matter by direct chemical investigation. Samples of cut and uncut tobacco were obtained and tested for sugar by the copper test, the fermentation method, and the polariscope. The copper test not yielding concordant results was discarded: it is a good test under most circumstances, but for the quantitative estimation of sugar in tobacco infusions, or probably in similar vegetable infusions and decoctions, it appears to be untrustworthy. The examination of tobacco infusion by the polariscope will be referred to subsequently.

All the samples readily yielded alcohol when properly fermented with yeast; hence all, presumably, contained sugar, the amount varying from 4 to 9 per cent. But as they were obtained from ordinary trade sources, and as tobacco has been known to have molasses, honey, and other varieties of sugar mixed with it, the samples obviously might contain sugar, and yet sugar not be a natural constituent of tobacco.

I therefore proceeded to examine specimens obtained from museums and one which had been raised in my own garden during the previous summer. The latter contained only traces of sugar; but it had been grown in the open, at anything but a tropical temperature, and was not, I think, ordinary Virginian tobacco, but rather the Maryland variety. I may even state, here, that a sample grown in my garden last summer, under better conditions of sunlight, with more care, and from which the flowering tops were frequently nipped off to promote development in the leaves, furnished less than two per cent. of saccharoid matter. Of the other samples some did and some did not afford evidence of the presence of sugar. A specimen of old dark colored Indian leaf gave no sugar, a light colored Indian leaf yielded 1.54 per cent., calculated as cane sugar. A bundle of leaves marked "Original sample as drawn from dock at Liverpool," furnished 10.84 per cent. These results being unsatisfactory, for my purpose, I at

once asked six or eight of my chemical and pharmaceutical friends, residing in different parts of the great tobacco-producing States of America, namely, Virginia, Kentucky, and North Carolina, to obtain for me authentic samples of genuine tobacco. Each correspondent, kindly, at once, acceded to my request. Neither was in any way connected with the tobacco interest, each resided many miles from the rest, and neither of my friends knew that others were simultaneously collecting samples for me.

While waiting for these authentic samples of American tobacco leaves I ascertained that such precipitants as basic acetate of lead and lime water would remove, from tobacco infusions, alcohol-yielding material, equivalent, on the average, to about 3 per cent. of the tobacco. The saccharoid matter not thus separated may be termed *tobacco sugar*; while this, together with the fermentible matter precipitated by the reagents named, may be termed *total saccharoid matter*.

The samples from the United States duly reached me. They yielded the following results:

	IN 100 PARTS OF TOBACCO LEAF.	
	Tobacco Sugar.	Total Saccharoid Matter.
A.....	7.00	9.87
B.....	5.57	8.61
C.....	7.76	10.94
D.....	9.60	12.80
E.....	7.43	10.20
F.....	9.29	12.40
G.....	5.57	8.23
H.....	6.81	10.10
Average .....	7.38	10.39

The inference is obvious, namely, that tobacco does contain sugar, the amount varying from mere traces, in tobacco grown under conditions not favorable for the production of sugar within the plant, up to nearly 10 per cent., or possibly more, in the light colored or bright Virginian leaf. I say that, bearing in mind the origin and the results of the analyses of these specimens, their sugar, or fermentible saccharoid matter, is natural; unless we make the absurd assumption that amongst tobacco growers there exists a secret yet apparently universally enforced

conviction for saturating tobacco plants with a solution of a special and elsewhere unknown variety of sugar.

In cases of suspected sophistication the fermentation method of analysis would probably be adopted, and then as much as 13 per cent. of natural saccharoid matter, or possibly more, might be obtained from tobacco. I myself have examined a large number of commercial samples of tobacco, both uncut leaf and cut, in the form especially of cigarettes, and I have obtained by this method percentages of saccharoid matter varying from 4 to  $12\frac{1}{2}$ . Even a specimen of a popular dark colored tobacco, specially fermented to develop highly prized odors and flavors, but which, as chemists would expect, had probably lost much of its sugar during the process, yielded 3 per cent. of tobacco sugar and  $5\frac{1}{4}$  per cent. of total saccharoid matter. It will be seen that the greatest yield of sugar from the trade samples is less than the maximum from my standard samples of genuine tobacco. The average yields of the two sets were very close, both being very near to  $10\frac{1}{2}$  per cent. The results indicated, therefore, that the trade samples did not contain added sugar.

If a sample of tobacco contained added sugar its percentage of matter soluble in water would also be raised, and the proportion of matter insoluble in water *pro tanto* be reduced. My authentic samples yielded from 32 to  $37\frac{1}{2}$  per cent. of insoluble matter, the average being 35.7. One set of commercial samples yielded an average of 35.9 per cent. of insoluble matter; the assumption of any systematic sophistication of these by sugar was, therefore, again negatived.

The sugar in tobacco appears to possess little, if any, action on polarized light. Such a fact would be of considerable importance in any examination of tobacco infusion for added sugar,—sucrose, glucose, lactose, etc.,—which all exert well-marked dextro-rotatory or lævo-rotatory power on polarized light. The commercial samples of tobacco I have myself recently examined, with scarcely an exception, yielded infusions which, even when colorless, did not perceptibly affect a polarized ray; therefore, with a bare exception they were unadulterated by sugar. Certainly samples forwarded to me by officials of the Customs in London, at the request of owners, did not contain added sugar. But the fact has, also, theoretical importance, for the existence of a *tabacose*, as we may term it, if it is a true sugar, having such properties, would point to the existence of a sub-class of fermentible



but non-rotatory sugars. Possibly, however, the action of this fermentable substance on a polarized ray is only masked.

The isolation and complete chemical and physical investigation of the saccharoid principle or principles in tobacco remain to be accomplished. I should myself proceed with this work, but am assured by a friend that he has already commenced and intends to complete and to publish the results of such a research.—*Pharm. Jour. Trans.*, Jan. 12.

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## TESTS FOR VEGETABLE ALKALOIDS.

BY R. PALM.

The author has shown previously that the alkaloids are precipitated by solutions of alkaline sulphides or persulphides, and moreover that in contact with a solution of sodium thioantimonate, solutions of the alkaloid salts form characteristically colored precipitates consisting of the alkaloid hydrosulphides mixed with antimony sulphide. When the solutions of the alkaloid and reagent are dilute, these precipitates appear as colorless turbidities, which become yellow on exposure to the air; whilst with concentrated solutions they are yellow to reddish brown, and in saturated solutions they form resinous masses. The precipitation is more complete in dilute solutions, and is accelerated by gently heating, or by the addition of strong alcohol. In most cases the yellow precipitates are dissolved by excess of the thioantimonate; they are, with few exceptions, amorphous, and dilute acids only partially separate the alkaloid from them. The chemical composition of the precipitates has not been determined. Sodium thioantimonate produces the following changes with the alkaloids referred to. With quinine sulphate in dilute neutral solutions, a white turbidity; in stronger solutions, yellow flocks, which on shaking form resinous lumps and become darker. When hot solutions of the quinine salt and reagent are mixed, resinous masses form at once, which when dry fall to a fine yellow powder like lead iodide. With cinchonine sulphate, in dilute solutions, dark yellow (leather color) flocks form at once; they do not coagulate either on standing or heating. With quinidine sulphate, the effect is almost exactly the same as with the quinine salt, with the exception that the whole of the precipitate does not become resinous, and when dry is of a darker yellow color (an intense dark chrome-yellow): the precipitation is also more complete. With morphine hydrochloride in dilute solutions, yellow flocks are at

once deposited, which are darker in strong solutions, and when dry resemble powdered gamboge in color. With codeine hydrochloride, a flocculent precipitate is produced, which when dry resembles the quinine precipitate in tone, being a paler yellow than the morphine precipitate. With narcotine, in concentrated hot solutions, the precipitate coagulates in resinous masses, which when dry have the color of dry precipitated ferric hydroxide. With strychnine nitrate, the reaction is more sensitive than with all the other vegetable alkaloids, the strychnine being entirely precipitated, and moreover the precipitate is not soluble in excess of the reagent. In dilute solutions of strychnine nitrate, colorless flocks separate which become yellowish in air; in concentrated solutions, yellow flocks form which do not coagulate on standing, and when dry are of a fine intense deep golden yellow color. With brucine nitrate, when the reagent is added in successive portions to a moderately concentrated solution of this alkaloid salt, three distinct precipitates are obtained: 1. Reddish yellow, which collects in resinous masses. 2. Light golden yellow flocks. 3. Colorless flocks, which form a crust on the surface of the liquid. When the mixed precipitates are boiled with water, the greater part dissolves, leaving an amorphous deep orange residue. The solution deposits yellow crystals of the double sulphide.

With atropine sulphate in strong solutions, a yellow deposit is formed, which coagulates on shaking or heating, but when dry is not so dark as the dry morphine precipitate.

With bebeerine hydrochloride, a dark colored precipitate is formed which coagulates in strong, and especially in hot, solutions, and when dry is greyish brown. The alkaloids also form double sulphides with other metallic sulphides.

Lead chloride can be used as a reagent for vegetable alkaloids; it should be dissolved in a solution of sodium chloride, which dissolves more of the lead salt than cold water does. The precipitates are generally crystalline, and consist of a mixture of lead chloride and an alkaloid salt. Quinine and brucine form crystalline powders; cinchonine, morphine, and codeine small fine needles; the strychnine precipitate when dry forms a crystalline asbestos-like felted mass. The lead chloride is not so delicate a test as the thioantimonate. A strong solution of sodium chloride completely precipitates bebeerine from its solutions.—*Jour. Chem. Soc.*, 1884, p. 120; *Chem. News.*, vol. 48, p. 65.

THE SALTS OF NARCOTINE.<sup>1</sup>

BY DAVID BROWN\* DOTT, F.R.S.E., Pharmaceutical Chemist.

The subject I have chosen for discussion in this short paper has not, at first sight, a very obvious interest for pharmacists, but, I think further consideration will show that it has a bearing on pharmacy in two ways. These are, firstly, the importance of narcotine on account of its presence in nearly all the Pharmacopœia preparations of opium; and, secondly, the possibility of its salts passing into therapeutical use.

No one can have studied, ever so slightly, the literature of opium and its assay, and have failed to observe how frequently narcotine has been to the chemist a stumbling-block and source of trouble. We need not now discuss in what various ways this has arisen. Although it is now many years since Regnault and Robiquet prepared and analyzed the muriate of narcotine, there is still a prevalent idea that narcotine is not an alkaloid at all, or, at any rate, that it does not form well defined salts. In support of this statement it would be easy to select suitable quotations from several writers, but I shall take as my text the following from Professor Flückiger:<sup>2</sup> "The narcotine is present chiefly in the free state, as it is not really an alkaloid; it is, therefore, not, or not entirely, removed by water. With acetic acid, as well as with other acids, narcotine forms not well-defined salts; the acids are simply solvents from which it again separates as soon as the acid is neutralized." This is for the most part erroneous, as we shall very soon see. Let us first consider the various salts and their properties, so far as our knowledge goes.

*Meconate*.—This salt first engages our attention, as it is almost certainly the form in which narcotine exists naturally in opium. When narcotine and meconic acid are dissolved together in water, in molecular proportions, *i. e.*, two molecules of the base to one of the acid (which is di-basic), a syrupy solution is obtained which refuses to yield crystals. If evaporated, the salt dries as a varnish. Unlike most amorphous salts this is not readily taken up by water. When the proportions for the acid meconate are used, a clear viscous solution is obtained. This ultimately becomes filled with crystals, but I have not yet ascertained

<sup>1</sup> Read at an Evening Meeting of the North British Branch of the Pharmaceutical Society, January 16, 1884.

<sup>2</sup> "Year Book of Pharmacy," 1879, p. 543.

whether they are really a crystalline acid salt, or only the neutral salt with separated acid. "The books" give no information about these meconates.

*Acetate.*—This is one of the only two crystalline salts mentioned by the older authorities. According to Berzelius, it is prepared by "dissolving narcotine in concentrated acetic acid, and evaporating *in vacuo* in presence of lime." We prepared a quantity of acetate according to these directions (leaving out the lime). Narcotine will not dissolve in an equivalent of glacial acid; indeed, a clear solution was only obtained by warming with several times that amount. On cooling, the solution before long became filled with crystals, which were strongly pressed, first in calico and then between blotting paper. The crystals were immediately bottled, and two portions weighed off as quickly as possible. One of these was mixed with ten times its weight of calcic hydroxide, and exposed in the water-bath, while in the other the narcotine was determined by precipitation with ammonia.

23.04 grs. lost in w.-b. 0.36 gr. = 1.56 per cent.

26.45 grs. treated with cold water left undissolved 24.28 grs. By  $\text{NH}_3$  0.66 gr. was obtained in addition, making the total narcotine = 94.29 per cent.

	Calculated.	Found.
	+	
$(\text{C}_{22}\text{H}_{23}\text{NO}_7)_3 \cdot \text{C}_2\text{H}_4\text{O}_3 \cdot \text{H}_2\text{O}$	N 94.07	94.29
	$\text{H}_2\text{O}$ 1.36	1.56

Whence it is probable that the salt obtained as just described has the above composition. In any case, it is of no value on account of its insolubility in water, or (what amounts practically to the same thing) its immediate decomposition by water.

*Hydrochloride.*—The dry salt was correctly described by Regnault and by Robiquet, but they make no mention of water of crystallization. Dr. Wright was the first who fully investigated this salt, and our analysis leads to the same conclusion, that the normal hydrochloride has the composition  $\text{C}_{22}\text{H}_{23}\text{NO}_7 \cdot \text{HCl} \cdot \text{H}_2\text{O}$ . Strong solutions of this salt show a curious tendency to gelatinize, like the salts of cryptopia. The muriate of narcotine may be regarded as its most important salt, being easily prepared and fully soluble.

*Sulphate.*—I have not been able to find any published reference to this salt, which is readily obtained by dissolving narcotine with the theoretical proportion of sulphuric acid and allowing to crystallize.



Some of these crystals were dried by exposure to the air, and a weighed quantity of the air-dry salt placed in the water-bath.

14.55 grs. lost 0.10 gr. = 0.68 per cent.

Two portions of same salt dissolved in water, excess of ammonia added, and the precipitates collected and weighed.

17.200 grs. gave 14.30 grs. = 83.13 per cent.

6.555 grs. gave 5.45 grs. = 83.14 per cent.

14.55 grs. dried at 130° C. gave only 78.35 per cent., indicating decomposition at that temperature.

The salt dried in water-bath lost weight further in the air-bath at 120°. 9.74 grs. lost 0.675 gr. = a loss in weight of 6.93 per cent. on the air-dry salt.

From the results obtained it was suspected that the sulphate used in these experiments had been over dried by too long exposure to the air. A quantity of it was therefore moistened with water, and when apparently just dry was transferred to the water-bath.

9.740 grs. lost 1.48 grs. = 1.48 per cent.

It would therefore appear that narcotine sulphate has the composition  $(C_{22}H_{23}NO_7)_2 \cdot H_2SO_4 \cdot 4H_2O$ , and that it loses one molecule of its water below 100° C., the remainder at a higher temperature.

		Calculated.	Found.
+ $N_2H_2SO_4 \cdot 4H_2O$	$H_2O$	7.22	6.93
+ $N_2H_2SO_4 \cdot 3H_2O \cdot H_2O$	$H_2O$	1.71	1.48
$N_2H_2SO_4 \cdot 3H_2O \cdot H_2O$	$\begin{smallmatrix} + \\ N \end{smallmatrix}$	82.93	83.13

We have not prepared any other salts besides these, and it is indeed unnecessary to do so. The meconate, muriate and sulphate dissolve completely in water, and their solutions remain clear even when largely diluted. Not so the acetate. By adding hot water to a solution of narcotine in dilute acetic acid, the greater part of the alkaloid is precipitated. One thing is noticeable regarding all salts of narcotine, that their solutions are *acid*, *i. e.*, they behave as if they contained free acid. This I have no doubt they do, in common probably with all acid solutions of salts. When such a solution is shaken up with a solvent capable of dissolving the base, some of the base is taken up; as when a solution of narcotine muriate is agitated with ether. The process may perhaps be expressed in this way: Narcotine, hydrochloric acid, and water have each an affinity or attraction for the others. When narcotine muriate is dissolved in water, the latter attracts the acid so as

to cause a certain amount of decomposition in the salt, the affinity between the base and acid not being strong enough to resist the action of the water. Yet this affinity is sufficient to prevent any great decomposition, such as we have in the case of the acetate, where the addition of water causes an almost complete precipitation of the alkaloid. A kind of equilibrium is established, depending, no doubt, on the relative masses of the different components. When a portion of one of these is removed, as narcotine by benzine, the equilibrium is disturbed and rights itself by a little more decomposition, and so on. But it is not necessary to have the salt in solution in order to remove the base by an appropriate solvent. So weak an alkaloid is narcotine that its salts are decomposed, to some extent, by such compounds as ether and "benzin," so that by simply rubbing up the dry salts with one of these solvents, an amount of the alkaloid is dissolved out. Having regard to all these facts, and to what is known otherwise of narcotine and of opium, we are led to the conclusion that narcotine is undoubtedly an alkaloid, that it readily forms salts, and that it exists in opium as meconate (at least for the most part). It is no uncommon occurrence for alkaloidal salts to crystallize with varying proportions of combined water according to circumstances. I have observed this in the case of narcotine hydrochloride, one sample giving numbers indicating three molecules of water. According to Beckett and Wright, the hydrochloride of narcotine forms a series of basic salts by successive crystallizations from hot water. Their experiments I have not repeated, but the muriate certainly stands one recrystallization without decomposition.

Gmelin<sup>1</sup> states, on the authority of Bouehardat, that the molecular rotatory power of narcotine is  $-130.6^{\circ}$  or  $-151.4$  for the red ray, but that it is not ascertainable with exactness on account of the slight solubility of the alkaloid in alcohol and ether. "On addition of acids it acquires a rotatory power towards the right, the original rotatory power being brought back by neutralization with ammonia." The rotatory power of acid solutions of narcotine was found by Bouehardat to vary according to the quantity and nature of the acid. More recently Hesse has determined the specific rotatory power of narcotine with the following results:<sup>2</sup>

	Alcohol.	Chloroform and alcohol.	Chloroform.
C	= 0.74	2	2 and 5
$[\alpha]_D$	= $-185.0$	$-191.5$	$-207.3$

<sup>1</sup> "Handbook," xvi, 137.

<sup>2</sup> "Watts' Dict.," viii, 1223.

It may be thought that these numbers do not agree very well, but it is now understood that the "specific rotatory power" may vary according to the nature and proportion of the solvent used; even although that solvent has no action by itself on polarized light. All that we obtain in such cases is an apparent rotatory power which may differ widely from that of the pure substance. It is, therefore, necessary to state the solvent and the percentage of substance dissolved therein, as the angle of rotation does not vary directly as the amount of substance, when the latter is in solution.

Before knowing of Hesse's work on the subject, I determined the specific rotatory power of narcotine dissolved in "benzin," the solution containing 1.59 per cent. My friend Mr. W. Peddie, Assistant to the Professor of Natural Philosophy in the University, kindly made a duplicate determination for me, he using a Duboscq's polariscope with compensator, and I using a Jellet. Our results are practically identical and give the value  $[\alpha]_D = -229^\circ$ . It was, of course, ascertained in the first place that the benzin did not affect appreciably the polarized light. I can confirm Bouchardat's observation that acids change the polarization from left to right, a solution of narcotine in dilute oxalic acid giving  $[\alpha]_D = +62$ .—*Pharm. Jour. and Trans.*, Jan. 26, 1884, p. 582.

## CINCHONAMINE.

BY ARNAUD.

Cinchonamine,  $C_{19}H_{24}N_2O$ , (See "Am. Jour. Phar.," 1882, p. 76) exists in *Remijia purdiana*, but is not contained in *R. pedunculata*, which contains quinine. To extract cinchonamine, the finely powdered bark is exhausted with very dilute sulphuric acid, the solution filtered, boiled, and precipitated with milk of lime. The precipitate is dried on porous tiles, and digested with boiling ether. The ethereal solution is decanted from undissolved resinous substances, etc., washed with dilute hydrochloric acid, which removes the cinchonamine, and the acid solution of cinchonamine hydrochloride is evaporated to crystallization. The hydrochloride is dissolved in boiling dilute acid, filtered through animal charcoal, and recrystallized. The free base is obtained by adding ammonia to a solution of the hydrochloride, and crystallizing the alkaloid from boiling ether. An alcoholic solution of the alkaloid is dextrogyrate, its rotatory power being  $[\alpha]_D = +122.2^\circ$ . Accord-

ing to Dr. Laborde, cinchonamine is highly poisonous, even in very small doses.

The salts of cinchonamine generally crystallize readily, and are but slightly soluble in water, especially in presence of free acid. They dissolve in hot alcohol, from which they crystallize on cooling. The *hydrochloride* crystallizes from an acid solution in thin, brilliant, anhydrous, prismatic lamellæ, very slightly soluble in acidulated water. From a neutral aqueous solution, the salt crystallizes in opaque flattened prisms containing 1 mol.  $\text{H}_2\text{O}$ . These crystals effloresce, and are much more soluble in water than the anhydrous salt. This property of the hydrochloride to crystallize in an anhydrous condition from acid solutions furnishes a method of separating cinchonamine from all the alkaloids with which it is associated in *R. purdiana*. The *hydrobromide* forms brilliant, slender, anhydrous needles, slightly soluble in cold water, much more soluble in hot water. The *hydriodide* crystallizes in micaceous plates, almost insoluble in cold water. The *nitrate* is only slightly soluble in cold alcohol, but is much more soluble in hot alcohol, from which it crystallizes in hard, thick, short prisms. This salt is slightly soluble in pure water, but is insoluble in acidulated water, and is precipitated on adding nitric acid to even a dilute aqueous solution of any cinchonamine salt. The precipitate is at first flocculent, but, on standing, it rapidly becomes crystalline, the crystals being small prisms, which polarize light. At  $15^\circ$ , 100 parts of alcohol of  $94^\circ$  dissolve 0.825 part of the salt; 100 parts of water at the same temperature dissolve 0.2 part of salt. The *sulphate* can be purified by crystallization from alcohol. A solution of the salt in water containing 1 mol.  $\text{H}_2\text{SO}_4$  has a rotatory power at  $15^\circ$   $[\alpha]_D = +43.5$ ; at  $25^\circ$   $[\alpha]_D = +42.2$ . The *formate* crystallizes with difficulty. The *acetate* is very soluble in water, from which it is deposited as a resinous mass on evaporation. By spontaneous evaporation of the aqueous solution the salt is obtained in deliquescent crystalline concretions. The *oxalate* does not crystallize from an aqueous solution, but is deposited in a resinous form. The *tartrate* forms a crystalline powder consisting of small hexagonal prisms which polarize light. 100 parts of water at  $15^\circ$  dissolve 1.150 parts of the salt. The *malate* forms brilliant nacreous plates, very slightly soluble in cold water, but somewhat soluble in boiling water. The crystals retain 1 mol.  $\text{H}_2\text{O}$  at  $120^\circ$ , but melt and become anhydrous at  $160^\circ$ . 100 parts of water at  $15^\circ$  dissolve 1 part of malate. The *citrate* is deposited from a boiling solution on cooling



as a resinous mass, which gradually becomes crystalline, forming concretions composed of brilliant prisms which polarize light. 100 parts of water at 16° dissolve 1·950 parts of the citrate.—*Jour. Chem. Soc.* 1884, p. 87; *Comp. Rend.* vol. 97, p. 174.

## PUTREFACTION ALKALOIDS.

BY A. POEHL.

Epidemics caused by unsound bread have long been recognized, and it has been observed that they are preceded by long-continued rains and floods, which cause an abundance of ergot (*Claviceps purpurea*) in the following harvests. These epidemics take two forms, viz., *Ergotismus convulsivus* more common in France, Switzerland, and this country, and *Ergotismus gangrænosus*, which prevails in Russia, Germany, and Sweden. In Russia there were two remarkable outbreaks of the latter in the years 1832 and 1837, which caused a mortality among children attacked of 1 : 1·75 to 1 : 4, and of the former in 1824. In the course of the rainy summer of 1881 Russia was threatened with another outbreak of ergotismus; accordingly the Minister of the Interior instituted a Commission, of which the author was a member, to investigate this phenomenon of ergot.

Eichwald in his history of ergotismus epidemics, has shown (1) that the appearance of the epidemic stands in no direct relation to the proportion of blight in the grain; (2) that animals cannot be so inoculated as to produce in them similar symptoms; (3) that the putrefaction of the corn is a necessary condition of the ergotismus; (4) that the poisonous results are produced only in certain stages of the decomposition; (5) that the various forms of ergotismus cannot be explained by the quantity of ergot introduced within the system or its time of action.

In the present paper, the author elucidates the following conditions of the putrefaction alkaloids in blighted rye meal: (1) the conversion of the starch into glucose; (2) fermentation of the glucose with formation of lactic acid, (3) peptonization of the albumins by the peptic action of the mycelium of *Claviceps purpurea*; (4) conversion of the peptone into ptomopeptone, and its decomposition with formation of putrefaction alkaloids.

*Firstly.* In the year 1873, the author recognized that damp caused in the meal a large proportion of glucose, by the action of a ferment

contained in the endocarp and perisperm of the grain. The experiments of Hammersten have also proved that the starches of maize, rye, and oats are more easily converted into glucose by diastatic action than the starches of potatoes, peas, and wheat (comp. Bell's recent researches, *Jour. Chem. Soc.*, 1883, p. 1160). In this connection it may be mentioned that the inhabitants of Lombardy suffer from an epidemic caused by maize. A form of mildew has been observed on maize, and this has the power of peptonizing albumins, with formation of putrefaction alkaloids.

*Secondly.* In the presence of a ferment the glucose would further decompose into butyric and lactic acids.

The author further observed that rye grain, even if not attacked by the claviceps, yet when merely exposed to damp, evolved trimethylamine when heated with alkalis, and it is well known that albumins at the moment of putrefaction evolve ammonia or amines under the action of alkalis.

*Thirdly.* One of the most important phenomena of the change of the albumin of meal is the formation of peptones; it has also been noticed that lactic acid is a better test for peptonization than other acids, as phosphoric, acetic, oxalic, or tartaric. The author has frequently observed the formation of peptone from the albumin of meal, caused by the action of *Penicillium glaucum* and the fungus of *Claviceps purpurea*, the latter of which produces the most marked effects.

*Fourthly.* The author exposed pure and tainted rye meal to a damp atmosphere, and found that the latter more readily entered into decomposition, with formation of the putrefaction alkaloids or ptomaines. Further large quantities of pure and tainted meal were allowed to rot, and the putrefying mass examined from time to time by Stas-Otto's process. From alkaline and from acid ethereal extracts of the mass, substances were obtained of various degrees of consistence and of various odors. These products gave all the general reactions for alkaloids, and differed from one another towards precipitants and color reagents according as they had been obtained at various stages of the decomposition. By shaking the alkali solution with chloroform, benzene, and amyl alcohol, an alkaloid was obtained, which gave precipitates with potassio-mercuric iodide, phosphomolybdic and tungstic acids, potassio-bismuth and cadmium iodides, platinum and gold chlorides, etc. It also gave a beautiful violet coloration with Fröhde's reagent (sulphuric acid and sodium molybdate), resembling that produced by morphine; the absorption-spectra, however, of the two alka-

loids differ most markedly. The author was only able to observe the formation of the above alkaloid during summer time.

Starting from the view that peptones on further putrefaction are converted into ptomopeptones which yield nitrogen when heated with sodium hypobromite, then the quantity of nitrogen so evolved may be taken as a measure of this conversion. Accordingly the author made comparative experiments with samples of damp rye meal and meal mixed with peptic ferment, with 5 per cent. ergot, and with blight. The results are given in the table below.

Time of Action.	Percentage of nitrogen given off from			
	Pure meal.	Meal with blight.	Meal with ergot.	Meal with peptic ferment.
3 days.....	0.1316	0.1671	0.1933	0.3762
4 " .....	0.1527	0.2592	0.2909	0.3949
8 " .....	0.1989	0.2842	0.3157	0.4210
13 " .....	0.2196	0.3415	0.4269	.....
20 " .....	0.5259	.....	0.5662	.....

From these results it follows: (1) that ergot and mould have a peptonizing action on the albumins and favor their decomposition; (2) the degree of putrefaction of the albumins is directly proportional to their peptonization; (3) in the first stages of putrefaction, the decomposition of the albumins is greater in ergot meal than in mouldy or pure meal, but in the more advanced stages these differences are not so marked. Further researches on the decomposition of albumins by the *Claviceps purpurea*, and the part played by various genera of fungi are promised.—*Jour. Chem. Soc.*, Dec., 1883; *Berichte*, xvi, p. 1975.

**The Physiological Action of Coffee.**—According to the result of experiments recently made by Messrs. Couty and Guimaraes to ascertain the precise physiological action of coffee, that beverage is not a preventer of tissue-waste. The maintenance of nutrition is, no doubt, improved by its consumption, as Gubler asserted; but simply because it involves an increased assimilation of nitrogenous food through improving the appetite, when not taken in excess, and thereby encouraging its consumer to take nutritious food.—*Louiso. Med. News*; *Brit. Med. Jour.*

## A "RENNET" FERMENT CONTAINED IN THE SEEDS OF *WITHANIA COAGULANS*.<sup>1</sup>

BY SHERIDAN LEA, M.A., Trinity College, Cambridge.

The Report of the Royal Gardens at Kew for 1881 contains abstracts of correspondence in which it was pointed out that, in order to introduce a cheese-making industry in India, some vegetable substitute must be found for the ordinary animal rennet, since cheese made with the latter is unsaleable among the natives. In response to the above "Surgeon-Major Aitchison brought to the notice of the authorities at Kew that the fruit of *Puneeria*<sup>2</sup> *coagulans*, a shrub common in Afghanistan and Northern India, possesses the properties of coagulating milk;" and experiments showed that an aqueous extract of the seed-capsules of the above plant does somewhat rapidly coagulate milk.

I was recently requested to make some experiments on the seeds of *Withania* to determine whether they contain a definite ferment with the properties of ordinary rennet, and the applicability of such a ferment to cheese-making purposes.

The material supplied to me consisted of an agglomerated dry mass of seed-capsules and fragments of the stalks of the plant. When crushed in a mortar the whole crumbled down into a coarse powder, in which the seeds were for the most part liberated from the capsules. I picked out the larger pieces of stalk, sifted out the finer particles, chiefly earth and fragments of the capsules, and then by a further sifting I separated the seeds from the other larger particles. The seeds appeared to be each enveloped in a coating of resinous material, presumably the dried juice of the capsules in which they had ripened.

Taking equal weights of the seeds, I extracted them for twenty-four hours with equal volumes of (i) water, (ii) 5 per cent. sodic chloride, (iii) 2 per cent. hydrochloric acid, (iv) 3 per cent. sodic carbonate. Equal volumes of each of the above were added in an acid, alkaline, and neutral condition to equal volumes of milk, and heated in a water-bath at 38°C. The milk was rapidly coagulated by the salt and sodic carbonate extracts, much less rapidly by the other two; of the four, the salt extract was far the most rapid in its action. All subsequent

<sup>1</sup> Communicated by Professor M. Foster, Sec. R.S.—From the "Proceedings of the Royal Society."

<sup>2</sup> The genus *Puneeria* is now reduced by botanists to *Withania*.



experiments have shown that a 5 per cent. solution of sodic chloride is the most efficient in the extraction of the active principle from the seeds.

There is no doubt that the substance which possesses the coagulating power is a ferment closely resembling animal rennet.

I. A portion of the 5 per cent. sodic chloride extract loses its activity if boiled for a minute or two.

II. The active principle is soluble in glycerin, and can be extracted from the seeds by this means; the extract possesses strong coagulating powers even in small amounts.

III. Alcohol precipitates the ferment body from its solutions; and the precipitate, after washing with alcohol, may be dissolved up again without having lost its coagulating powers.

IV. The active principle of the seeds will cause the coagulation of milk when present in very small quantities, the addition of more of the ferment simply increasing the rapidity of the change.

V. The coagulation is not due to the formation of acid by the ferment. If some of the active extract be made neutral or alkaline and added to neutral milk, a normal clot is formed, and the reaction of the clot remains neutral or faintly alkaline.

VI. The clot formed by the action of the ferment is a true clot, resembling in appearance and properties that formed by animal rennet, and is not a mere precipitate.

Having thus determined the presence of a rennet ferment in the seeds, I endeavored to prepare an active extract, which should be applicable for cheese-making purposes. All the extracts of the seeds are of a deep brown color, and it appeared, therefore, in the first place desirable to obtain less highly colored, if not colorless, solutions, which should still be active. In this I have so far failed. The precipitate caused by alcohol carries down the chief part of the coloring-matter also, so that on being subsequently redissolved the solution is nearly as highly colored as before the precipitation. The color can be removed by using animal charcoal, but the ferment is at the same time destroyed. If all excess of charcoal is avoided and the solution is filtered at once, the filtrate is largely decolorized, but contains only traces of the ferment. Animal rennet is similarly removed by filtration through charcoal. The color can be removed by the addition of very finely-powdered kaolin in a dry state, but, as before, the ferment activity is thereby destroyed. The same holds good of animal rennet. The

coloring-matter is scarcely soluble in either ether or alcohol, so that no advantage is gained by a preliminary treatment with these before extraction with the salt solution. I have also endeavored to get rid of the color by treating the seeds as rapidly as possible with successive quantities of water before making the final extract. By using a centrifugal machine I was able to wash the seeds six or seven times with large volumes of water without their being exposed for any considerable time to the action of the water. Each portion of water was highly colored and the seeds were thus freed from adherent coloring-matter. But, apart from the fact that some, though not much, ferment is thus lost, no special advantage is obtained, since the seeds are themselves colored, and even after prolonged treatment with water the final extract is always of a dark brown color.

In order to obviate the disadvantages of this coloring matter, if disadvantage it is, I have found it best to prepare very concentrated active extracts of the purified seeds, so that it should only be necessary to add a very small quantity of the extract in order to coagulate the milk and obtain a colorless curd. This I have done by grinding the dry seeds very finely in a mill and extracting them for twenty-four hours with such a volume of 5 per cent. sodic chloride solution that the mass is still fluid after the absorption of water by the fragments of the seeds as they swell up. From this mass the fluid part may be readily separated by using a centrifugal machine (such as is used in sugar refining), and it can then be easily filtered through filter-paper; without the centrifugal machine the separation of the fluid from the residue of the seeds is tedious and imperfect, 40 grams of the seeds treated as above with 150 cubic centims. of 5 per cent. sodic chloride solution gave an extract of which 0.25 cubic centim. clotted 20 cubic centims. of milk in twenty five minutes, and 0.1 cubic centim. clotted a similar portion of milk in one hour. When added in these proportions the curd formed is quite white. The presence of the coloring-matter is however, perhaps on the whole unimportant, since even if a larger quantity of the ferment extract is added in order to obtain a very rapid coagulation the coloring matter is obtained chiefly in the whey, the curd being white.<sup>1</sup>

<sup>1</sup> It is extremely probable that some stage in the growth or ripening of the seeds of *Withania* might be found at which the development of coloring-matter is slight, while at the same time the ferment is present in considerable quantity.

The question of preparing an extract which should be capable of being kept for a considerable time is perhaps of importance. Ordinary commercial rennet usually contains a large amount of sodic chloride and some alcohol. One specimen I analysed contained 19 per cent. of common salt, and 4 per cent. of alcohol. I have, therefore added to the 5 per cent. chloride extract mentioned above, enough salt to raise the percentage of this to 15 per cent., and also alcohol up to 4 per cent. The activity of the extract is not appreciably altered by this, and such a preparation corresponds very closely in activity with a commercial solution of animal rennet with which I compared it. The possibility of making extracts which may be expected to keep is thus indicated, but of course time alone will show whether the activity of the ferment is impaired to any important extent by such keeping.

I may add in conclusion that I have coagulated a considerable volume of milk with an extract such as I have described, and prepared a cheese from the curds. I have also given a portion of the extract to a professional cheese-maker who has used it as a substitute for animal rennet in the preparation of a cheese. The product thus obtained, and the statements of the person who has made the experiment for me, lead me to suppose that extracts of the seeds of *Withania* can be used as an adequate and successful substitute for animal rennet—*Pharm. Jour. Trans.*, Feb. 2, 1884, p. 606.

## FERMENTATION OF CELLULOSE.

BY H. TAPPEINER.

Finely divided cotton-wool or paper is introduced into a flask containing a neutral one per cent. solution of extract of meat. The vessel is heated at  $110^{\circ}$ , and when cold a small quantity of the contents of the pancreas is added. Fermentation begins in a few days: the gases evolved consist chiefly of marsh-gas and carbonic anhydride. These two gases are in the ratio of 1 to 7.2 at the beginning of the process, but the carbonic acid afterwards diminishes to the ratio of 1 : 3.4.

The actual figures are:

	Commencement.	End.
CO <sub>2</sub> .....	} 85.48	76.98
SH <sub>2</sub> .....		
H.....	0.03	.....
CH <sub>4</sub> .....	11.86	23.01
N.....	2.73	.....

Acetic and isobutyric acids are the chief products of the fermenta-

tion, 5.5 grams of cotton-wool yielding 5.8 grams of volatile acids. Acetaldehyde is also formed. Cellulose undergoes similar fermentation in the first stomach of ruminants and in the alimentary canal of herbivora. When the preceding experiments are varied by rendering the meat-extract feebly alkaline, by adding Nægeli's solution (potassium phosphate 0.2 gram, magnesium sulphate 0.04 gram, and calcium chloride 0.02 gram), or a solution containing in addition to the above salts, 0.35 per cent. of ammonium acetate, 0.3 acetamide, or 0.6 asparagin, the following results were obtained:

	0.5 per cent. solution of meat extract,	Asparagin.	Acetamide.
CO <sub>2</sub> .....	} 55.39	86.47	78.14
SH <sub>2</sub> .....			
H.....	42.71	5.73	13.68
N.....	1.90	7.80	8.18

No difference could be detected in the bacteria in the two kinds of fermentation. In addition to aldehyde, isobutyric and acetic acids, a small quantity of ethyl alcohol appears to be formed by the "hydrogen" fermentation of cellulose.

Alcohol, aldehyde and acetic acid are produced during the fermentation of hay. The gases evolved contain CO<sub>2</sub> 51.15, H 44.58, CH<sub>4</sub> 0.9, N 4.18 per cent.—*Jour. Chem. Soc.*, Dec., 1883; *Berichte*, xvi, 1734–1740.

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**Chloroform Water.**—This application, which is much employed in Paris, is prepared as follows: An excess of chloroform is poured into a bottle three parts filled with distilled water, and, after repeated shaking, the mixture is allowed to stand until the extra chloroform is deposited and the liquid quite clear. The transparent portion is then to be removed by a syphon, forming a saturated solution of ten grams of chloroform per liter. Applied on compresses, either in its pure state, or diluted with a half or its whole weight of water, it is found to relieve superficial pains; but when these are more deeply situated, a very hot linseed meal poultice is first applied, which is afterward replaced by the compress of chloroform-water. Active revulsion is thus produced, which relieves the pain. Associated with a weak solution of opium, it relieves vague dental pain; and with syrup of morphia it is successfully given internally for various forms of *malaise* from indigestion, such as gapings, eructations, sense of weight, etc. It is also useful as a palliative in cancer of the stomach.—*Union Médicale—Louisv. Med. News.*



## SOME AFRICAN KOLAS,

IN THEIR BOTANICAL, CHEMICAL AND THERAPEUTICAL ASPECTS.<sup>1</sup>

BY E. HECKEL AND F. SCHLAGDENHAUFFEN.

Among the vegetable products of the African soil, there is perhaps none more interesting and valuable than those which under the various names of "kola," "gourou," "ombéné," "nangoué," and "kokkorokou," are used as articles of consumption throughout tropical and equatorial Africa, as equivalent to tea, coffee, maté and cacao. Used under the form of seeds, probably from time immemorial, by the native tribes, these products are of varying botanic origin, and their history has been up to the present time imperfectly known; but the authors have been able to avail themselves of the observations of some recent travelers to clear up some obscure points.

The products which are included by the authors under the name "kola" (the various synonyms quoted being special to particular countries) consist of seeds, yielded by two families of plants and differing very much in appearance. The kind most widely distributed, the "true kola," which by some of the natives is called the "female kola," comes from the *Sterculiaceæ*; another variety, called by the author "false kola," is known among the negroes as simply "kola," or "male kola." Before the authors' researches only the "true" or "female" kola was known, and it had been ascertained to be yielded by the *Sterculia acuminata*, P. de Beauv. (*Cola acuminata*, R. Br.). To this Messrs. Heckel and Schlagdenhauffen are able now to add information concerning the "male" kola, hitherto unknown, and to give reasons for believing that various other species of *Sterculia*, besides *S. acuminata*, yield kola seeds.

Dealing first with "female" kola, the authors describe at length *Sterculia acuminata* from specimens, the description agreeing with Oliver's description of var. *a* (Fl. Trop. Af., i., 220.) According to the best information, the tree—which is from 30 to 60 feet high, and in general aspect resembles the chestnut—grows wild upon the western coast of Africa comprised between Sierra Leone and the Congo or Lower Guinea, reaching into the interior about five or six hundred miles, where it appears to follow the limits of the palm. Upon the eastern coast it appears to be unknown in places where it has not been introduced by the English. Dr. Schweinfurth, speaking of the country of the Nyams-Nyams, near lake Nyanza, says that among the imposing forms of vegetation a *Sterculia* of the kola kind predominates and is called locally "kokkorokou." In the country of the Momboutous (24° E. long., 3° N. lat.), too, upon asking for kola he was supplied with the fruit in its rose-colored envelope; but the only information he could obtain there concerning it was that the nuts were found in the country in the wild state and were called "nangoué" by the natives, who chewed slices of it whilst smoking. Karsten, in his "Flore de Colombie,"

<sup>1</sup> Abstract of a lengthy memoir read before the Union Scientifique des Pharmaciens de France (*Journ. Pharm. et de Chimie*, [5], vii, p. 553; viii, p. 81, 177.

describes the plant as growing wild in the moist hot woods near the southern coast of Venezuela, but the authors believe it was probably introduced there about the same time as it was introduced into Martinique, and that it was sown by African negroes, who brought it into those countries in the same manner as they are known to have introduced *S. cordifolia* for the sake of its delicious fruit. It has also been introduced successfully by the English into the East Indies, the Seychelles, Ceylon, Demerara, Dominica, Mauritius, Sidney and Zanzibar, and by the French recently at Guadelope, Cayenne, Cochin China and the Gaboon. In all these stations the kola tree flourishes best in moist lands at the sea-level, or a little above. At Sierra Leone some fine trees are found at an elevation of 200 or 300 metres, but not higher than that.

The kola tree commences to yield a crop about its fourth or fifth year, but it is not until about its tenth year that it is in full bearing. A single tree will then yield an average of 120 lbs. of seed annually. The flowering is nearly continuous after the tree reaches maturity, so that a large tree bears flowers and fruit at the same time. There are two collections; the June flowering yielding the fruit in October and November, and that of November and December in May and June. When the fruit is ripe it takes a brownish yellow color. In this condition dehiscence of the capsule commences along the ventral suture, exposing red and white seeds in the same shell. It is at this period that they are gathered. It has been stated that there exist two varieties of kola, one yielding exclusively red seeds and the other white; but the authors have been repeatedly assured that this is not the case, and that one and the same capsule may contain fifteen seeds varying considerably in size, white and red together, without the white being considered less ripe than the red. The carpels are from 6 to 9 centimetres long and 3 to 5 thick and the spongy pericarp is about 2 or 3 millimetres thick. As many as five or six ripe carpels may result from a single flower, and these may each contain from five to fifteen seeds; but sometimes carpels are met with containing only a single seed. The seeds removed from their envelope weigh, according to their development, from 5 to 25 or 28 grams. The epiderm is the principal site of the coloring matter, and beneath it the cotyledonary tissue consists of a mass of cells gorged with large starch granules comparable to potato starch. It is in these that the alkaloids caffeine and theobromine are found in the free state.

The collection is conducted with great care and is made by women. The seeds are removed from the husk and freed from the episperm. In order to maintain their value among the negroes it is necessary to keep them in a fit state and in good condition. They are, therefore, carefully picked over, all damaged and worm-eaten seeds being removed, and the sound seeds are then placed in large baskets, made of bark and lined with "bal" leaves (*Sterculia acuminata*, Car., or *S. heterophylla*, Beauv.); the seeds are heaped up and then covered over with more "bal" leaves which, by their thickness, resistance and dimensions, contribute not a little to the preservation of the seeds by keeping them from contact with dry air. Packed in this manner the seeds can be transported considerable distances, remaining free from mould for about a month, during which time it is not necessary to submit them to any treatment in order to preserve them fresh beyond

keeping the "bal" leaves moist. But if it be desired to keep them beyond that time the operations of picking and re-packing have to be repeated about every thirty days; the seeds being washed in fresh water and fresh "bal" leaves placed in the baskets. The baskets usually contain about 3 cwts. of seeds. It is in this condition that "kola" is sent into Gambia and Gorcee, where the principal dealings in the seeds are carried on. In Gambia they are sold in the fresh state to merchants traveling with caravans into the interior, who dry them in the sun and reduce them to a fine powder, which is used, mixed with milk and honey, by the tribes of the interior to make a very agreeable, stimulating and nourishing beverage. It most frequently arrives at Sokota and Kouka in the Soudan and Timbuctoo, where large sales of the seeds are made, in the fresh condition; from the Soudan markets it is carried by caravans to Tripoli, and from Timbuctoo into Morocco. As might be expected the value of the Kola increases as it makes its way into the interior of Africa, and the authors state that some of the tribes furthest removed from the sea pay for the dry powder with an equal weight of gold dust. Kola plays an important part in the social life of many of the African tribes, and the authors mention some of the occasions upon which it is used in terms almost identical with those in a paper read at an evening meeting of the Pharmaceutical Society eighteen years ago (*Pharm. Journ.*, [2], vi., 450.) An interchange of white kola between two chiefs is indicative of friendship and peace, whilst the sending of red kola is an act of defiance. An offer of marriage is accompanied by a present of white kola for the mother of the lady; the return of white kola is equivalent to acceptance of the suit, whilst red means rejection. The absence of a supply of kola from among the marriage presents would endanger the whole arrangement. All the oaths are administered in the presence of kola seeds; the negro stretches out his hand over them whilst he swears and eats them afterwards.

Fresh kola is used as a masticatory, as is also the dried powder, by the tribes in the interior. When fresh the taste of the seeds is first sweet, then astringent and finally bitter. When the seeds become dry the bitterness diminishes, giving place to a sweeter flavor; but upon steeping them in water for a couple of days the original bitterness is nearly restored. Preference is given for mastication to seeds containing only two cotyledonary segments, it being asserted that they are less rough than those with four to six segments; but the authors did not find anything in their chemical examination to explain this preference. The practice of kola mastication, which is always accompanied by the swallowing of the saliva, does not injuriously affect the teeth, as is the case with the betel nut, but tends to render the gums firm, and exercises a tonic influence on the digestive organs. The seeds are reputed to clarify and render healthy the most foul waters, and to render tainted meat edible, and when chewed, either fresh or as a dry powder, and the saliva swallowed, to be a sure preventive against dysentery. They are also said, like *Erythroxylon Coca*, to possess the physiological property of enabling persons eating them to undergo prolonged exertion without fatigue, which is probably to be attributed to the caffeine they contain. Further it is said that kola exercises a favorable influence upon the liver, and that white people, living in those regions, who chew a



small quantity before meals escape constitutional changes due to affections of that organ. They are also believed by the negroes to have aphrodisiac properties. With respect to the assertion that the pulp or powder of the seeds thrown into foul water has the property of cleaning it, an experiment made by the authors would appear to show that any action in this direction would be due to the formation of a kind of mucilage, which would act mechanically like the white of an egg.

It has been pointed out that the name "kola" is applied in Africa indifferently to several Sterculaceous seeds other than those of the two varieties of *Coca acuminata*, although these are the most valued in the native markets. It is probable that the African plants capable of yielding seeds resembling the true kola are *Cola Duparquetiana*, Baill., *C. ficifolia*, Mast., *C. heterophylla*, Mast., *C. cordifolia*, Cax., and perhaps *Sterculia tomentosa*, Hend. But the authors think it doubtful whether these seeds contain caffeine, otherwise they would be as much sought after as the true kola.

In order to determine chemically the composition of kola seeds, the authors made a large number of experiments; the details fill many pages in the original paper. The dry seeds were first operated upon, and the process which appeared to give the best results was to exhaust the dried powder successively with chloroform and alcohol. The chloroform percolate was a yellowish liquid; this was evaporated to dryness, and the residue treated with water, which separated a fatty substance with an odor recalling that of cacao butter and entirely saponifiable by caustic potash. The yellow liquid upon concentration after filtration, deposited silky needles of caffeine, but when the solution was rapidly evaporated and the residue treated with water, ether or chloroform it no longer completely dissolved without using a considerable quantity and boiling, and upon such a solution cooling a small quantity of a compound crystallized out in microscopic prisms and octahedra which proved to be theobromine. The substances separated by chloroform from the dry nuts, were—caffeine, 2.348 per cent.; theobromine, 0.023 per cent.; tannin, 0.027 per cent.; fat, 0.583 per cent.

The kola powder was then dried and exhausted with alcohol. A mahogany colored extract was obtained which when treated with boiling water dissolved entirely, but the solution on cooling deposited a large quantity of coloring matter. The aqueous solution was precipitated with triplumbic acetate, the precipitate decomposed with sulphuretted hydrogen, and a liquid obtained, free from bitterness, containing a considerable quantity of a tannin giving an intense green color with persalts of iron, and a soluble coloring matter that formed lakes in contact with metallic solutions; the residue of the aqueous solution, after removal of excess of lead, was found to contain only glucose and a small quantity of fixed salts. The coloring matter deposited upon the cooling of the boiling water used in dissolving the alcoholic extract differed in its nature from the soluble coloring matter. It appeared to be an oxidation product from the tannin and presented considerable analogy to cinchona red; in order to distinguish it, therefore, the authors have named it "kola red."

The composition of the alcoholic extract from the dry nuts (5.826 per cent.) was found to be—tannin, 1.591 per cent.; kola red, 1.290 per cent.; glucose, 2.875 per cent.; fixed salts 0.070 per cent.



The entire composition of the kola nut is compared by the authors with that of tea, coffee and cacao as follows :

	Cacao (Mitscherlich)	Coffee (Payen).	Tea Green Black (Peligot).		Kola (Authors').
Fat.....	53.00	13.00	0.28	.....	0.585
Proteid Matters.....	13.00	13.00	3.00	2.80	6.761
Theobromine.....	1.50	.....	.....	.....	0.023
Caffeine.....	.....	2.25	0.43	0.46	2.348
Essential Oil.....	0.04	0.003	0.79	0.60	undet.
Resin.....	.....	.....	2.22	3.64	.....
Sugar.....	0.5	15.50	.....	.....	2.875
Starch.....	.....				33.754
Gum.....	.....	.....	8.58	7.28	3.040
Cellulose.....	.....	34.00	17.08	26.18	29.831
Coloring Matters.....	.....	.....	17.24	19.20	2.561
Coloring Matters.....	5.00	.....	2.22	1.84	1.290
Extractive.....	.....	.....	22.80	19.88	.....
Tannin.....	.....	.....	17.80	12.88	1.618
Ash.....	3.60	6.697	5.56	5.24	3.395
Water.....	6.00	12.00	.....	.....	11.909
	100.00	100.00	100.00	100.00	100.00

These results, it is pointed out, differ somewhat from those obtained by Attfield (*Pharm. Journ.*, [2], vi, 457,) especially in the recognition of the presence of a second alkaloid and of tannin. The proportion of caffeine is higher than that observed in any coffee, or, except in rare instances, in tea, and exceeds that of theobromine in cacao. The alkaloid exists in kola, as in tea, uncombined, but in coffee, according to Payen, it is present as chlorogenate of potassium and caffeine. It is worth mentioning that the authors report the presence of a considerable proportion of caffeine and some theobromine in the pericarp, but the material at their disposal was too scanty for an exhaustive investigation in this direction. The leaves, wood and bark were also examined for alkaloid, but gave negative results. As in the case of coffee, kola undergoes a considerable loss of caffeine (three-fourths) during roasting, while the quantity of essential oil present is augmented.

Some experiments have been made with this kind of kola in the treatment of the atonic diarrhoea to which Europeans are frequently liable in tropical countries. The results have been fairly satisfactory, and through the efforts of M. Heckel the medicine has been supplied to some French colonial stations for a systematic trial. The preparations used are an aqueous extract, an alcoholic extract and a wine. The alcoholic extract is

made by exhausting fresh kola with 5 parts of 60° alcohol and the wine by macerating the same proportions of kola in a sweet white wine during a fortnight. Neither of these preparations, however, completely exhaust the kola, at least as far as the caffeine is concerned. The preparation of an aqueous extract presents considerable difficulty in consequence of the quantity of starch, which forms an unmanageable magma.

Concerning the "male kola" or "kola bitter," as before stated, nothing definite was known, and as recently as the year 1882, it was referred erroneously to a species of *Sterculia*. In the "Flora of Tropical Africa," Oliver says: "The kola bitter of Fernando-Po is the product of trees belonging to the Guttiferae. The authors were led by this remark to attempt to obtain from various parts of the eastern coast specimens of the plant yielding "kola bitter," and although the flowers did not reach them they received specimens of the branches, leaves and fruits, together with a sufficient quantity of seeds to allow of a complete analysis being made. All the specimens received from various places corresponded in their characters, and showed that the kola bitter is the produce of a single Guttiferous species and not of several. From the material at their disposal the authors refer it to a new species, *Garcinia Kola*, Heckel.<sup>1</sup> The plant is described as a tree of variable aspect, 10 to 20 feet in height, bearing towards the base of the branches large opposite leaves (12 in. long by 7 in. broad,) with short petioles, whilst at the extremity of the branches the leaves are much smaller (5 in. by 2 in.) The leaves are oval, slightly dilated at the base, mucronate at the apex, without stipules, full green on the upper surface and greyish underneath. The fruit is a berry the size of an apple, with a rugose epiderm covered entirely with rough hairs. It presents three or four divisions, each containing a large oval cuneiform seed, rounded on the external and angular on the internal face; the seeds are covered with an abundant sourish yellowish pulp, constituting a true arillus. The fruit has at the base the persistent calyx still adherent to the peduncle, and sometimes the persistent corolla, and at the apex the persistent stigma. The plant is reported to occur all along the eastern coast of Africa and of Senegal, intermixed with the *Sterculia acuminata*, flourishing under the same conditions, but less widely distributed. In its known characters the plant would appear to be closely allied with *Garcinia Morella*, which, however, is essentially an Asiatic species. The seeds present one convex and two plane surfaces, the former being towards the circumference of the fruit. They are covered by an apricot-yellow episperm, below which is a large yellowish-white macropodous embryo, devoid of cotyledons, and with numerous depressions on its surface. The tissue is denser and closer than that of true kola and crackles under the teeth; it consists of a compact mass of very homogeneous cellular tissue, interspersed here and there with laticiferous vessels of varying size containing resin, the cells constituting which are filled with starch granules larger than those occurring in true kola.

<sup>1</sup> The plant yielding "bitter kola" was identified as a species of *Garcinia* by Dr. Maxwell T. Masters eight years ago, and was partly described and the fruit figured by him in the *Journal of Botany* for March, 1875.—Editor *Phar. Jour.*, February 2, p. 610.

Upon chewing these seeds a strongly bitter, astringent and yet aromatic taste is perceptible, which is quite different from that of true kola, and approaches in its aromatic flavor that of green coffee; it is this aromatic flavor that is esteemed by the negroes. It is worthy of remark that although the use of these seeds does not produce any notable stimulant effects or ward off fatigue, they are as much sought after and fetch nearly as high a price on the eastern coast as the true kola. In the interior, however, they are unknown. The authors are of opinion that these seeds owe their properties to the resin they contain, which is slightly stimulant. By the negroes they are thought to exercise an aphrodisiac action, which the authors consider doubtful, and as a masticatory, they are said to be a valuable remedy for colds.

An examination of fresh male kola nuts for caffeine gave negative results, the chloroform, ether and alcoholic percolates being all free from alkaloid. Besides coloring matter, tannin and glucose, two resins were separated. One of these was brown, hygrometric and soluble in ether and melted at the temperature of the water-bath; the other was yellowish-white, soluble in ether, alcohol, acetone and acetic acid, insoluble in carbon bisulphide or petroleum spirit, and had a high melting point.

A large proportion of the paper is devoted to a study of the constitution of caffeine and several of its derivatives, in reference to the identification of the alkaloidal substances obtained by the authors from the female kola.--*Phar. Jour. and Trans.*, Jan. 26, 1884, p. 586.

## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, February 19, 1884.

In the absence of the President Mr. Alonzo Robbins was called to the chair. The minutes of the last meeting were read and approved.

Professor Maisch presented the report of the Chief Signal Officer of the War Department for 1881; the Year Book of Pharmacy for 1883; the Calendar of the Pharmaceutical Society of Great Britain, 1884; a monograph, by Prof. Hamberg, upon the physiological effects of the odorous volatile principles of whiskey, in the Swedish language; and a syllabus of a course of lectures on Pharmacy by Prof. E. L. Patch, of Boston, Mass. These books were all referred to the Librarian to be entered on the catalogue and arranged in the library.

Mr. Gustavus Pile exhibited some specimens of finely drawn aluminium wire, suitable for small weights each of the pieces weighed one centigramme.

Dr. Miller presented a specimen of gum siftings, which has been offered for sale for tobaccoist's uses; it is much darker and inferior than that usually sold for such purposes; the very greatly increased price of all varieties of gum, consequent upon the war in Egypt, has probably induced vendors to offer low grades in hopes of realizing on them.

Mr. Pile asked if oil of limes was an article of merchandise and attain-



able in commerce. Dr. Miller said it was sold under the name of oil of limetta.

Professor Trimble exhibited the outer shells of the coffee bean, from Liberia, that had been handed to him to examine for caffeine, and hoped to be able to report on it at a future meeting.

There being no further business, on motion, adjourned.

T. S. WIEGAND, *Registrar.*

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## EDITORIAL DEPARTMENT.

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UNOFFICIAL FORMULAS.—We have, in former volumes, frequently drawn the attention of our readers to the inconveniencies arising from the use by pharmacists of preparations made according to unpublished processes, and from prescribing by physicians of preparations of which they know little more than the names. These inconveniences are so generally known and acknowledged as evils, that attempts have been frequently made in various localities to secure uniformity in the dispensing of such preparations. One of the first measures undertaken by the American Pharmaceutical Association after its organization was the collection of unofficial formulas in local use. This was suggested by Mr. John Meakim, of New York, and in 1853, on motion of Mr. Joseph Laidley, of Richmond, Va., the Executive Committee undertook the collection of such formulas; but not receiving any aid from others, it was deemed advisable in 1856 to appoint a special committee of ten, which was subsequently increased to fourteen, with Mr. Meakim as chairman. This committee collected a considerable number of formulas which were published in the Proceedings, 1857 and 1858. A number of unofficial formulas were also reported by Mr. J. F. Hancock, of Baltimore, in 1874.

While the "elixir nuisance" was at its height, committees were appointed and presented formulas at the meetings held in 1873 and 1875, and by special vote of the Association, these formulas were recommended for general use and were also officially communicated to the various medical societies in the United States with the suggestion that physicians if prescribing elixirs at all, make use of the formulas recommended. This action did not remove the evil, but it invested at least these formulas with a certain authoritative-ness, capable of producing greater uniformity in a set of preparations, nearly all of which, it seems to us, should be left to extemporaneous prescription.

But as long as physicians can be induced to resort to other than pharmacopœial preparations, the necessity will also exist to devise formulas for such, no matter how transient or ephemeral their use, or how slight their medicinal value may be. This necessity exists everywhere; hence the compilation of numerous formularies, several of which are recognized in European countries as authorities in such cases where the pharmacopœia does not supply the want.

At the last meeting of the American Pharmaceutical Association a motion made by Mr. J. W. Coleord, of Lynn, Mass., was carried and a committee



on unofficial Formulas was appointed. This committee has divided the necessary labor among its members, and it is to be hoped that by this division of labor formulæ may be secured which may be used by the pharmacists in all parts of the country, and which may, at least in a measure, do away with the ready-made medicines of the present market. To accomplish as much good as possible, it is desirable that the committee should be aided by all interested. Formulas may be sent to the chairman, Mr. Colcord, or if on special subjects, may be communicated to the sub-committee having that subject in charge. These committees are as follows: *On elixirs.*—J. T. Shinn, Philadelphia; W. M. Searby, San Francisco; M. W. Alexander, St. Louis; N. H. Jennings, Baltimore, and J. D. Wells, Cincinnati. *On ointments.*—S. A. D. Sheppard, Boston. *On fluid extracts.*—Ewen McIntyre, New York. *On emulsions.*—Chas. Becker, Washington, D. C. *On pills.*—C. L. Keppler, New Orleans, and R. H. Cowdrey, Chicago. *On wines.*—J. W. Colcord, Lynn, Mass.

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A PROPOSED NATIONAL PHARMACOPŒIA.—The "Journal of the American Medical Association," January 26, 1884, contains the text of the following bill, which was introduced by Mr. Randall in the House of Representatives, January 8th, read twice, referred to the Committee on Ways and Means, and ordered to be printed:

A BILL TO PREPARE AND PUBLISH A NATIONAL PHARMACOPŒIA FOR THE UNITED STATES.

*Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled,* That the Secretary of the Treasury shall, as soon as practicable, detail two officers of the Marine Hospital Service, and the Secretary of War shall detail two officers of the Medical Staff of the Army, and the Secretary of the Navy shall detail two officers of the Medical Staff of the Navy, for the duty of compiling and preparing a Pharmacopœia, which shall be known as the "National Pharmacopœia of the United States of America," and shall be held and accepted as the standard for the purveying, compounding and dispensing of drugs or medicinal agents, and shall be taken as authority in the Treasury Department on all questions arising under the tariff laws of the United States with regard to the nomenclature, description and purity of drugs or remedial agents, and shall further be received as evidence in the United States courts. And the matters contained in the said Pharmacopœia shall be free for use by all authors and commentators for the benefit of the medical and pharmaceutical professions, and of the community at large; and it shall not be lawful for any one to reprint and publish the said Pharmacopœia as a whole.

SEC. 2. That the medical officers detailed as above provided shall invite the American Medical Association and the American Pharmaceutical Association, at their next annual meetings, to form committees of not more than three members from each of the said Associations, which committees, if so appointed, may co-operate with the above-named medical officers in the preparation of the said Pharmacopœia, forming a board which shall have power from time to time to add to its number as may in its judgment be necessary, and which shall elect a chairman and a secretary, and adopt such rules as it shall see fit for the expediting and perfecting of the said

Pharmacopœia, which, when completed, shall be printed under the supervision of the said board; and an edition of not less than five thousand copies shall be printed for use in the several Departments of the Government of the United States; and copies may be furnished to private persons in accordance with the provisions of section thirty-eight hundred and nine of the Revised Statutes.

SEC. 3. That, for the purpose of defraying the necessary expenses of preparing the said Pharmacopœia, the sum of five thousand dollars is hereby appropriated out of any moneys in the Treasury not otherwise appropriated, and the same shall be disbursed under regulations to be prescribed by the Secretary of the Treasury.

SEC. 4. That the said Pharmacopœia shall be revised once in ten years, upon the plan embodied in this Act.

Without intending for the present to enter into details, we merely wish to point out what, in our opinion, would be the most important result of a law recognizing a Pharmacopœia for the United States. We find this in the legal establishment of standards for medicines imported or sold under certain titles (those of the Pharmacopœia).

Regarding the plan for the formation of a committee for preparing such a work, it will be observed that three distinct Government Departments are to be represented therein, each by two medical officers. Excepting the importations of medicines, these Departments are directly interested, in the first place, only to the extent of the supplies for their hospitals, and as for all hospitals the regular supplies furnished are limited in variety, but the special supplies may embrace any article of medicinal use. In this respect, these medical officers are in a similar position as all other physicians who, as a rule, employ only a very limited number of drugs; but the former, from the occasional change of their sphere of activity, have the best opportunities of familiarizing themselves with the remedies used in different sections of the country; and, in addition to this, according to the proposed law, they are to invite the co-operation of the National Medical and Pharmaceutical Associations. It would therefore seem as if by this plan the real wants of all parts of the country could well and properly be ascertained and taken care of.

The experience of all countries have shown that the real work in preparing a Pharmacopœia must be done by pharmacists, while it belongs to the special province of the physician to designate the drugs and preparations which should be admitted in such a work, and of the galenical preparations also their relation to the drug from which they are made. Unfortunately, pharmacy, as such, is not recognized in the different Government Departments, and we fear that it will be a long time before it will be accorded that position which it holds in France. On the part of these Departments, therefore, pharmacists cannot be detailed for such a duty; but provision has been made that the board may "add to its number as in its judgment may be necessary," and, if this power is judiciously exercised, it will doubtless be in the direction of adding pharmacists and other experts with the view of making the contemplated work as useful and reliable as possible.

## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

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*The Medical Directory of Philadelphia for 1884.* Edited by Samuel B. Hoppin, M. D. Philadelphia: P. Blakiston, Son & Co. 8vo, pp. 205. Price \$1.50.

The Directory contains alphabetical lists and street lists of the regular, homœopathic and eclectic physicians, with the dates of their diplomas; also, lists of persons practising medicine without diplomas; alphabetical and street lists of apothecaries; medical and pharmaceutical colleges; medical societies, hospitals and other institutions and societies; also, the laws of Pennsylvania referring to the practice of medicine. The book has evidently been prepared with great care.

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*Proceedings of the Convention of Druggists and of the First Annual Meeting of the Michigan State Pharmaceutical Association*, held at Lansing, Nov. 14 and 15, 1883. Muskegon, Mich.: Jacob Jesson, Secretary. 8vo, pp. 67.

In May, 1874, a State Pharmaceutical Association was organized in Detroit, and subsequently one or two meetings were held, after which the Association went out of existence. We are pleased to note now the initial meeting resulting in the formation of a new Association, which, to judge from the membership, and from the work done, gives promise of activity and usefulness in the future. The officers for the first year are: Frank Wells, Lansing, President. Isaac Watts, Grand Rapids; I. L. H. Dodds, Buchanan, and W. B. Wilson, Muskegon, Vice Presidents. Jacob Jesson, Muskegon, Permanent Secretary. A. W. Allen, Detroit, Assistant Secretary; and Wm. Dupont, Detroit, Treasurer. The next meeting will be held in Detroit on the Second Tuesday of September, 1884.

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*Proceedings of the Fourth Annual Meeting of the Iowa State Pharmaceutical Association*, held in Davenport, Tuesday and Wednesday, May 1st and 2d, 1883. Iowa City, Ia. 8vo, pp. 96.

A brief account of this meeting will be found on page 334 of our last volume. The pamphlet contains a portrait of the former President of the Association, Mr. A. R. Townsend.

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*Fifty-first Annual Report of the Managers of the Pennsylvania Institution for the Instruction of the Blind.* To which is appended an Account of the Celebration of the Semi-Centennial Anniversary of the Foundation of the Institution. 8vo, pp. 40.

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*Proceedings of the Naval Medical Society.* Washington, D. C.

The greater portion of the pamphlet before us is taken up with remarks on yellow fever.

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*The Absence of Design in Nature.* A lecture delivered before the Philosophical Society of Chicago. By Prof. H. D. Garrison.

# THE AMERICAN JOURNAL OF PHARMACY.

APRIL, 1884.

## THE SO-CALLED BISMUTH BREATH.

BY WILLIAM REISERT, PH.G.

*Abstract from an Inaugural Essay.*

Bismuth oxynitrate, when taken into the human system, often imparts to the breath a very perceptible, and disagreeable garlic-like odor, which is very annoying, not only to the person who has taken the salt, but particularly disagreeable to the persons with whom they may come in contact. This odor has been attributed by writers to be caused by impurities in the bismuth salt, such as arsenic and tellurium, and some have asserted that the chemically pure bismuth salt itself produces the odor. The subjoined experiments will add to the already known facts concerning the cause of the production of this odor, namely, the ingestion of tellurium, which element occurs as an impurity in many samples of bismuth oxynitrate.

Chemically pure sesquioxide of bismuth was prepared by dissolving the commercial oxynitrate in chemically pure nitric acid, and precipitating with an excess of water. This operation of redissolving and reprecipitating was repeated twice, and the precipitate was then strongly heated in a porcelain crucible to convert it into bismuth sesquioxide, and at the same time to volatilize any arsenic which might have been contained in the substance. Tests for arsenic and tellurium in the resulting sesquioxide failed to denote their presence.

The bismuth sesquioxide thus purified was administered to five persons under the same, and under different conditions as to dose and time. From 0.5 to 1.0 gram was given three times daily for six days. No garlic-like odor could be recognized in the breath.

To investigate the action of arsenic in the production of this odor in the breath, arsenious oxide was taken by myself, in doses of 0.003 gm. after each of the three daily meals for three days. On the fourth day, on account of the gripping pain produced in the abdomen, and a violent



diarrhœa, only two doses were taken. There was not the slightest garlic-like odor perceptible in the breath.

Tellurium is comparatively rare, and is contained in many of the ores of bismuth. The mineral tetradyomite contains as much as 49.79 per cent., Wehrlite, 29.74 per cent., and Joseite, 15.93 per cent. of the element. In a sample of metallic bismuth from Bolivia, Schneider<sup>1</sup> found 0.14 per cent. of tellurium. Brownen<sup>2</sup> found tellurium in the commercial bismuth oxynitrate, but it was not present in large quantity. On account of difficulties in its separation from bismuth, it often occurs as an impurity in the commercial bismuth oxynitrate, yet in most cases the quantity present is very minute. If more care were used in the preparation of the commercial oxynitrate, less would be heard of the so-called bismuth breath. Repeated precipitation and washing will entirely remove the obnoxious element.

As early as 1824 the odor produced by the ingestion of tellurium compounds was noticed by Gmelin.

In 1853 Hansen<sup>3</sup> investigated the cause of the production of the odor. This investigator experimented upon himself and a friend, and upon dogs, with potassium tellurite. This salt, in doses of 0.030 to 0.080 gm., taken by himself an hour before each meal, gave the garlic-like breath within a few minutes after the first dose, and this odor soon became so strong that he had to seclude himself from society. He continued the doses during seven days, his friend continued the doses for two days with similar effect, and noticed the odor in his breath for eight days afterward.

It is also stated that Wöhler, when investigating the volatile telluride of ethyl, noticed this same odor in his breath, and one night, when perspiring freely, the odor of the perspiration was almost unbearable. In the experiments on dogs the garlic-like breath was perceptible after one minute. Hansen quotes Gmelin as having in 1824 given tellurous acid to a dog and a rabbit. The rabbit only was killed, and on dissection gave off a garlic-like odor.

Sir J. Simpson<sup>4</sup> records a case in which a divinity student inadvertently swallowed a dose of tellurium, which was followed by the evolu-

<sup>1</sup> Jour. f. Prakt. Chem.

<sup>2</sup> Phar. Jour. Trans., Oct. 16th, 1875; Amer. Jour. Phar., 1876, p. 133.

<sup>3</sup> Liebig's Annalen, lxxxvi, p. 208.

<sup>4</sup> Blyth Manual of Chemistry, Lon., 1879.

tion of such persistent odor that for the remainder of the session the patient had to sit apart from his fellow students.

The experiments in this direction made upon several friends, and also upon myself are as follows:

Tellurous oxide ( $\text{TeO}_2$ ) was prepared by treating metallic tellurium with nitric acid, evaporating to dryness and igniting the product. Some of the resulting tellurous oxide was taken by myself in doses of 0.005 gm. each. Three doses were taken on May 8, 1883, at 1, 4, and 7 o'clock P. M. In 15 minutes after the first dose the breath had a strong garlic-like odor, and in an hour a metallic taste was observed. An hour after the second dose the urine and sweat had the garlic-like odor, which was also observed in the feces on May 12. The metallic taste was observed for 72 hours, and the garlic-like odor in the urine for 382 hours, in the sweat for 452 hours, in the feces for 79 days, and in the breath it was still present, though very faintly, after 237 days.

In order to determine the smallest quantity of tellurous oxide which would be required to produce the garlic-like odor the following solutions were made:

I. 0.001 gm. of tellurous oxide was dissolved in potassium hydrate and sufficient distilled water to obtain 100 cubic centimeters. 5 cc. contain 0.00005 gm. tellurous oxide.

II. 0.00025 gm. of tellurous oxide was dissolved with the aid of a little hydrochloric acid in sufficient distilled water to make 100 cc. 5 cc. are equal to 0.0000125 gm. of tellurous oxide.

III. Made like the preceding, but diluted to 200 cc. 5 cc. are equal to 0.00000625 gm. tellurous oxide.

IV. 0.0001 gm. tellurous oxide, sufficient hydrochloric acid and water to measure 100 cc. 5 cc. are equal to 0.000005 gm. tellurous oxide.

V. Like the preceding, but diluted to 500 c.c. 5 cc. are equal to 0.000001 gm. tellurous oxide.

VI. 100 cc. of solution V was diluted with 100 cc. of distilled water; each cc. represents 0.0000001 gm. tellurous oxide.

These solutions were given to a number of young men; but no one was experimented upon a second time.

I. After one dose of 5 cc. of this solution, the garlic odor became perceptible in the breath in 35 minutes and lasted about 75 hours.

II. Three doses of 5 cc. each were taken after three succeeding

meals. The odor was noticed in the breath 30 minutes after taking the third dose, and continued about 66 hours.

III. Five doses of this solution of 5 cc. each were taken after five succeeding meals, when the odor was soon noticed, and lasted about 90 hours.

IV. After six doses of 5 cc. each, the odor was quite distinct; three additional doses were taken and the odor lasted 96 hours.

V. Five doses of 5 cc. each were taken after five consecutive meals; the odor was noticeable in 45 minutes and lasted 73 hours.

VI. After one dose of 5 cc. the garlic odor was perceptible in 75 minutes and lasted about 30 hours.

Smaller quantities of this solution were then given, namely, 1 cc. to each of two young men, 2 cc. to two persons and 3 cc. each to three persons; but no garlic like odor could be detected.

The nature of the compound which possesses this garlic-like odor is, as yet, not understood, although Hansen attributes the odor to be caused by a volatile organic compound of tellurium like the telluride of ethyl, which is given off by the lungs and skin. Both methyl and ethyl telluride have a garlic-like odor.

In this investigation the breath of myself which was exceedingly strongly impregnated with the garlic-like odor, was for several hours passed through a tall column of distilled water contained in a wash bottle, and the water afterward tested for compounds of tellurium, but not even a trace of this element could be found. However, from the minute quantity of the element which is required to produce this odor one would hardly expect to find by qualitative testing even the merest trace of the element in the breath. Necessarily, the presence of tellurium in such a minute quantity in the great majority of samples of the bismuth oxynitrate would prevent its detection by any of our chemical tests. From this failure to detect tellurium most likely have arisen the many statements<sup>1</sup> of its non-presence in the commercial bismuth oxynitrate. The physiological test seems to be the most delicate as has been shown, that in this way as little as  $0.0000005$  gm. or  $\frac{1}{125000}$  of a grain of tellurous oxide equal to  $0.0000004$  gm. or  $\frac{1}{166000}$  of a grain of the metal may be detected.

In these experiments idiosyncrasy seems not to have had any influence at all. Every one to whom the tellurium compound was administered in sufficient quantity was affected with the garlic-like odor.

<sup>1</sup> Dr. Squibb, *Ephemeris*, Sept. 1882.

## DISPENSING BY DROPS.

BY ALBERT HENRY KINSEY, PH.G.

*Abstract from an Inaugural Essay.*

The size of a drop generally depends upon and is influenced by at least four conditions.<sup>1</sup>

First: the self-attraction that the particles of liquids have for each other.

Second: its adhesion to the matter on which it is formed.

Third: the shape of this matter.

Fourth: the physical relations existing between the matter on which it is formed, the liquid constituting the drop itself, and the medium through which it passes.

In my experiments I have found that the greatest variance is caused by the third condition, viz.: the shape of the matter, to which may be added the amount of surface, as it is obvious that the more surface the greater will be the adhesion, and therefore will require more liquid to overcome this force, and consequently will produce a larger drop. This is practically illustrated below, when, in dropping from a glass stopper the surface from which the liquid has been dropped has a U-shape and is formed on the convex side, while from a minim measure it is dropped from the concave side of a V-shaped surface, giving the drop only a very small point to form on, and therefore must be much smaller. This is further illustrated in dropping from a glass stopper held at different angles. When held horizontally the drop is about twice the size of one dropped at an angle of 45 degrees. The difference is still greater when a common cork is taken, as it has a more acute angle. In the case of tincture of opium, the drop from a common cork, when held in a horizontal position, was more than twice as large as when held at an angle of 45 degrees.

Another very important feature in the matter of dropping is the rapidity with which it is done. It is a well-known fact that the less the interval between successive drops, the larger they will be. This interval has been called the growing time, and it follows that if this growing time is constant in the same liquid, the size of the drop will be the same.

<sup>1</sup>See also paper by Prof. C. F. Himes, in "Amer. Jour. Pharm.," p. 394, 1883.—EDITOR.



It has been shown by actual experiments, that when the growing time is decreased below 0.333 second (coco-nut oil was used in this instance) a continuous stream was the result, but of course the density of the liquid regulates this to a certain extent. It is also a curious fact that a stream so produced, delivers less in a given time than a series of large drops.

This rapidity of dropping is one of the greatest obstacles to overcome, for very few pharmacists will drop the same liquid in the same time, and if laws are to be laid down, governing dropping, the time certainly claims a large share of attention, for the same mistake is just as likely if not more so, to happen in this instance than in the previous one, for a pharmacist who dispenses 100 drops of a liquid at the rate of three drops a second, will give one half as much again as another who measures the same liquid at the rate of a drop every second and one half.

Prof. Guthrie has shown the effect of gradually decreasing the strength of saline solutions. Dropping, at the rate of two seconds, he found that decrease of solid constituents produced precisely the same effect upon the size of the drops, as a decrease in the growth rate in the drops of homogenous liquids. I find that these facts, however, have their greatest importance from a theoretical point of view, practically there is very little, if any, difference, although in some instances it does seem as though the matter in solution might be the cause of the decrease in size by increasing its specific gravity. The following table gives the result of my experiments, having chosen the glass stopper, minim measure and lip of the bottle in which the liquids are ordinarily kept, to drop from.

By comparing my table with those of Prof. Procter or Mr. Durand, it will be noticed, in a number of instances, that they vary very widely, about the only way I can account for this is, that the lip of the minim measure, which I used, must have been much smaller than theirs, but even when the same vessels are used, there is such a variety of results, that to get a medium size an average is required to be taken. This I have done in all of the unimportant liquids. How greatly they vary may be seen in the case of *Acetum opii*; in the first trial the result was 120 drops to a drachm, the second 85, and the third 103.

There are still other conditions which yield more or less influence on the size, and one which deserves mention, is the angle at which the vessel is held. I have already shown that a cork may be held so a

Preparation.	Shop bottle.	Glass stopper.	Minim measure.
Acetum Lobeliae.....	51	48	64
"    Opil.....	66	57	65
"    Sanguinariae.....	102	92	92
Acid. Acetic.....	82	49	101
"    Dilute.....	94	55	99
"    Carbolic.....	82	66	110
"    Hydrobromic.....	57	65	70
"    Hydrochloric.....	60	57	96
"    Dilute.....	70	51	62
"    Nitric.....	82	66	124
"    Dilute.....	63	60	81
"    Nitrohydrochloric.....	87	74	92
"    Dilute.....	58	54	62
"    Phosphoric.....	54	43	62
"    Sulphuric.....	160	152	172
"    Dilute.....	57	47	60
"    Sulph. Arom.....	97	94	144
Aqua Ammoniac.....	45	41	54
"    Destillata.....	64	.....	61
Liquor Potass. Arsen.....	58	61	77
Oleum Anisi.....	76	73	112
"    Amygdale Am.....	102	77	125
"    Cari.....	108	81	133
"    Chenopodii.....	94	75	129
"    Caryophylli.....	98	75	133
"    Cinnamomi.....	77	73	112
"    Crotonis.....	84	62	104
"    Cubebe.....	86	80	120
"    Gaultherie.....	93	93	136
"    Hedeomae.....	95	83	130
"    Lavandulae.....	105	78	133
"    Monarda.....	82	76	125
"    Menthae Pip.....	88	73	132
"    Viridis.....	95	81	132
"    Myristice.....	98	83	128
"    Origani.....	91	83	133
"    Pimenta.....	102	86	133
"    Rosmarini.....	92	88	133
"    Sassafras.....	83	77	142
"    Tanacet.....	110	91	136
"    Terebinthine.....	103	90	142
Spiritus Ammon. Ar.....	108	87	139
"    Camphore.....	98	79	140
"    Ether. Comp.....	120	88	140
"    Nit.....	88	86	144
"    Menthae Pip.....	98	86	143
Syrupus Scilla Comp.....	106	87	122
Tinctura Aconiti.....	120	102	164
"    Asafoetide.....	102	85	145
"    Belladonnae.....	94	81	128
"    Benzoini Co.....	98	81	146
"    Cannabis Ind.....	124	120	98
"    Cantharidis.....	118	97	136
"    Capsici.....	116	88	143
"    Colchici.....	86	80	124
"    Digitalis.....	114	79	145
"    Ferri Chlor.....	108	.....	139
"    Hyoscyami.....	114	91	147
"    Ignatie.....	112	83	140
"    Iodi.....	112	97	144
"    Kino.....	116	100	148
"    Kramerie.....	117	96	150
"    Lavand. Co.....	97	86	141
"    Lobeliae.....	110	79	138
"    Myrrhae.....	100	95	145
"    Nucis Vomicae.....	112	105	148
"    Opil.....	98	92	143
"    Camph.....	91	86	135
"    Deodor.....	109	89	141
"    Rhei.....	98	82	144
"    Sanguinariae.....	110	88	134
"    Serpentinariae.....	98	80	146
"    Stramonii.....	100	93	120
"    Tolutana.....	120	97	156
"    Veratri Virid.....	108	98	152
Vinum Aloes.....	71	54	94
"    Colchici Rad.....	92	72	95
"    Sem.....	86	71	105
"    Ergotae.....	148	99	122
"    Opil.....	96	72	102

drop can be obtained twice as large as another where the cork has been held at a different angle, the same is true with a bottle, but not quite in so great a degree.

The fulness of the bottle also exerts some influence, as tincture of aconite, when dropped from an ounce vial full, yielded 110 drops to the drachm, but when only one-fourth full gave 116 drops, also liquor potassii arsenitis, from a full ounce vial, gave 66 drops, and when one-third full, only 57. In the one case, decrease in the amount of liquid decreased the size, while in the other it was increased. The drop from an ounce vial was in most instances the same as from the shop bottle.

By a careful perusal of the above we can readily notice that the different classes of preparations can be grouped together, as for instance, the tinctures or alcoholic preparations may be classed as a group, whose drops are about one half the size of the aqueous liquids, while the oils and acids form an intermediate group between the two. Durand must have taken notice of this fact, when he laid down his two general rules concerning drops as follows :

First : that liquids, with a small proportion of water, afford a small drop, and vice versa.

Second : that amongst liquids containing a large proportion of water, those not charged with remedial substances, give a larger drop than those same liquids having extraneous bodies in solution.

In summing up my labors on this subject, there is only one general conclusion that I will mention, as it covers all of the others, and if properly heeded may be the means of saving considerable trouble, and I might say is also in harmony with those who before me have given the subject a still more thorough investigation. Having shown that the same liquid under different and even the same circumstances, varies in dropping so much, that no reliance whatever can be placed in this method of dispensing medicines, therefore their administration in this form is always attended with more or less danger.

**Iodine, Salicylic Acid and Sodium Salicylate**, according to Dr. Ritten, when applied to the skin either as simple solution, or as spray or in the form of ointment are not absorbed until after the normal skin has been altered by these irritants.—*Arch. f. Klin. Med.* xxxiv, p. 143.

## ON THE PRESENCE OF PIPITZAHUIC ACID

IN THE PEREZIAS FOUND IN THE TERRITORY OF THE UNITED STATES,  
AND ON THE GEOGRAPHICAL DISTRIBUTION OF THE NORTH  
AMERICAN SPECIES OF THAT GENUS.

By CHARLES MOHR, Mobile, Ala.

*Translated by the Author from Pharmaceutische Rundschau.*

The remarks on pipitzahoic acid which appeared in the "Rundschau" of November has directed the attention of the writer anew to a subject in which he felt himself greatly interested during his stay in Mexico in 1857, where he got acquainted with the publication of the researches of Rio de la Lozas, announcing his discovery of this peculiar organic acid, made a short time before. The inquiries after its source, the "*Raiz del Pipitzahuac*," made in consequence at the time in the leading drug houses of the city of Vera Cruz and at Orizava were leading to no results. Amongst the varied stock of the numerous drugs derived from Mexican plants no root was found of that name, and only a single species of *Perezia* was encountered during the frequent botanical excursions made in these parts of the Mexican republic, also the only one found amongst the large collection made by the botanist Bolteri, of Orizava. After a lapse of many years the determination of this plant was only made possible a few weeks ago, since the review of the North American *Perezias* by Prof. Gray has come to hand, where it is described under the name of *Perezia Dugesii*.<sup>1</sup>

These plants seem to shun the damp clime of the eastern declivity of the Mexican Andes; they are rather plants of the desert regions, finding their proper home, with the widest distribution, in the rainless, arid plains (*mesas*), and on the rocky hills of the highlands of northern Mexico and the adjoining parts of the United States.

The genus *Perezia*, Lag., as defined by Gray,<sup>2</sup> embraces bilabiate compositæ of the sub-order Labiatifloræ and the tribe Mutisiaceæ, with perfect and throughout homogeneous flowers, united to a greater or lesser number in heads with a naked receptacle, surrounded by a campanulate or top-shaped involucre of stiff elongated more or less lanceolate scales, imbricated in two or more rows. Corolla with a

<sup>1</sup> Gray, "Proceed. Am. Acad. Arts and Sciences," vol. xix, Oct., 1883.

<sup>2</sup> Gray, *loc. cit.*, and Botany of California, vol. 1.



slender tube, distinctly two-lipped, with the three-toothed exterior lip longer than the interior, with two teeth; the anthers are long caudate, with a more or less prominent lanceolate tip or crest-like appendage. The akenes are elongated cylindrical or slightly angled, often somewhat spindle-shaped, with a discoid apex, bearing a pappus of copious capillary, somewhat scabrous bristles. All the species are perennials, with more or less rigid leaves, with the simple stem bearing the white or purplish flowers in solitary heads or in corymbs. They are exclusively confined to the warmer parts of the American continent, and the 40 or 50 species known are equally divided between its southern and northern divisions. Those occurring in the latter are found in the highlands of Mexico and the adjacent parts of Central America, extending beyond the Mexican border into the territory of the United States as far north as the 34° of north latitude.

The North American species belong all to a group distinguished by the similarity of all the florets within one head, the three-toothed exterior lip of the corolla being even in the marginal flowers, scarcely if at all longer than the interior, forming the well-marked natural section *Acourtia*, established first as a proper genus by De Candolle. In the group embracing the South American species, the *Perezias* proper, found mostly south of the Equator, the interior lip of the corolla is considerably shorter than the ligulate exterior. For the establishment of the characters of the species belonging to the first of these groups, and for the determination of the limits of their distribution, we are indebted to Prof. Gray, who has particularly given many years of his arduous labors to the elucidation of the most prominent feature of the North American flora, the difficult order of *Compositæ*, with such eminent and distinguished success. The characters of these plants were before but vaguely defined, and variously understood; hence we find them referred to various genera; some were described under the genus *Dumerilia*, Less., others as species of *Trixis* and *Proustia*, section *Thelecarpus* and *Acourtia*, D. C. Of the 24 North American species recognized by Gray seven are found within the southwestern territory of the United States; they were mostly brought to light during later years by the explorations of the arid regions between southwestern Texas and the Pacific Ocean. The first five of the species enumerated below, the flora of the United States has in common with northern Mexico, and the two following seem to be confined to its limits.

*Species found in the United States.*

1. *Perezia nana*, Gr., Pl. Trendler 110, and Plant. Wright., i, 125, seems to be the most frequent, being found in all the collections made in Southwestern Texas, Southern New Mexico, all parts of Arizona and the adjacent parts of Mexico.

2. *Perezia runcinata*, Lag., from Chihuahua and Sonora to Arizona, and New Mexico as far east as the Colorado river in Texas, where it is not rare on the rocky hills near Austin.

3. *Perezia Thurberi*, Gr., Pl. Thurb., Sonora, Southern Arizona.

4. *Perezia Wrightii*, Gr., Plantæ Wrightianæ,—*P. arizonica*, Gr., Flor. Cal., not rare from Southwestern Texas and Southern Utah through Arizona to San Louis Potosi (Schaffner).

5. *Perezia Parryii*, Gr., Proc. Am. Acad. Sci. and Art, vol. xv. Southern Arizona.

6. *Perezia Wislizeni*, Gr., Plant. Fendl. Southern New Mexico.

7. *Perezia microcephala*, Gr., *Acourtia microcephala*, D. C. Coast of Southern California (Santa Barbara, Monterey).

*Species of Northern Mexico.*

8. *Perezia formosa*, Gr., *P. turbinata*, Gr., Pl. Wright., non Llav. et Lex. *Acourtia formosa*, Don. *A. macrocephala* and *Trixis turbinata*, Schultz Bip. Leg. Seemann.

9. *Perezia thyrsoides*, Gr. Bot. Mexic. Bound. Surv., leg. Berland.

10. *Perezia Seemannii*, Gr. Pl. Wright., leg. Seem. Northwestern.

11. *Perezia Coulteri*, Gray. Proc. Am. Acad. xv. Leg. Coult.

12. *Perezia patens*, Gr. *Acourtia formosa* and *Trixis patens*, Schultz Bip.

13. *Perezia platyphylla*, Gr. Fendler, leg. Coulter, Zimapan.

14. *Perezia rigida*, Pl. Gr. Pl. Wright. l. c. *Acourtia rigida*, D. C. *A. formosa*, Hook. et Arn.

*Species of Central Mexico.*

15. *Perezia adnata*, Gray. This is the mother plant of the Raiz del Pipitzahuac of the natives, brought first to the notice of European botanists by Schaffner, who collected the plant near Toluca. *Trixis Pipitzahuac*, Schaffner et Schultz Bip., *Dumerilia Alami*, D. C. *Perezia Alami*, Hensia Biol. of Central Americ., Bot. ii. *Morelia legit* Giesbrecht.

16. *Perezia hebeclada*, Pl. Wright. *Acourtia hebeclada*, D. C.  
 17. *Perezia turbinata*, Llav. et Lex. Valley of Mexico, legit Schaffner.

*Species of Eastern and Southern Mexico.*

18. *Perezia oxylepis*, Gr. Proceed. Am. Acad., xv. Puebla? Liebman.  
 19. *Perezia carpholepis*, Gr. *Acourtia carpholepis*, Schultz Bip. Liebman.  
 20. *Perezia Dugesii*, Gray. Proc. Am. Acad., xix., Guanaxuato Duges leg. *Acourtia spec.* Plant. Botteriana, 1172. Orizava. Botteri, Mohr legit 1857.  
 21. *Perezia moschata*, Llav. et Lex. Chiapas, Giesbrecht.  
 22. *Perezia reticulata*, Gr. *Proustia reticulata*, Lag. *Dumerilia reticulata*, Don. From the Valley of Mexico to Oaxaca, Galeotti.  
 23. *Perezia fruticosa* Llav. et Lex. A dubious species.  
 24. *Perezia nudicaulis*, Gray. Plant. Wright. Republic Guatemala, Skinner.

Of the species occurring in the United States, the writer has obtained specimens of two species, *Perezia nana* and *Perezia Wrightii*, for which he is indebted to the kindness of Messrs. Lemmon and Pringle, zealous botanists who have spent the past season in the botanical exploration of Arizona and Southern California. The roots attached to several specimens furnished sufficient material to establish the presence of pipitzahoic acid, and the specimens of great perfection served as originals for the accompanying illustrations of these most interesting plants.

*Perezia nana* Gr., of slender growth from 4 to 8 inches high, with a slender, creeping or ascending root-stock, articulated mostly, and the joints and head of which are covered with tufts of fine woolly hairs. The slender wiry stem is simple or sparsely branched from the base, slightly flexuous, angled and a little rough. The rigid, coriaceous leaves are shining, glandular, scabrous, strongly reticulate veined, roundish ovate,  $1\frac{1}{2}$  to 2 inches wide and but little longer, spinose toothed, sessile by a cordate base or amplexicaul. The large capitula are terminal, subsessile, 20-30 flowered with a campanulate involucre of mucronate cuspidate, ciliated scales, arranged in three rows, of which the exterior ones are ovate and the interior lanceolate, all purplish



*Perezia (Acourtia) nana*, Gray (natural size).—1. Corolla. 2. Stamen. 3. Achene (magnified). 4. Floret (natural size).





*Perezia (Acourtia) Wrightii, Gray.*—1. Leaf (nat. size). 2. Flower head (nat. size), with bases of cut pedicels. 3. Root ( $\frac{1}{2}$  nat. size). 4. Root deprived of the woolly covering. 5. Floret (nat. size). 6. Corolla. 7. Achene. 8. Stamens (magnified).

towards the apex. The akenes are whitish, glandular, puberulent, cylindrical, and have a pappus of copious hairs.

The root of a slightly bitter and astringent taste, imparts to strong alcohol a dingy yellow tint, which by the addition of a weak solution of a caustic alkali deepens to a clear deep yellow color. If a very dilute solution of sodic or potassic hydrate is carefully added, a faint and evanescent tint of impure purple color is perceptible, indicating the presence of small quantities of pipitzahoic acid combined with another substance. As would be expected by the deepening of the color, in consequence of the addition of an alkali to the tincture, this substance proved to be a tannic acid, ferric chloride producing an abundant precipitate of dark green color, which disappeared by the addition of oxalic acid. To obtain the pipitzahoic acid pure, the alcoholic tincture of the root was treated with boiling water, and the very minute quantity of a golden yellow crystalline precipitate washed by decantation. Examined under the microscope it was seen to form stellate groups of acicular or dagger-shaped golden yellow crystals characteristic to this compound, which by the addition of a drop of diluted solution of sodic hydrate are dissolved with the production of a beautiful deep violet color. Incomplete as the chemical investigation of the few decigrams of the root of this plant at command must appear, its results show that as a source of pipitzahoic acid, it is of but little value, which in reference to the therapeutical virtues claimed for this substance as a mild purgative, is further impaired by the largely predominating quantities of tannic acid with which it is associated. Of greater interest, in that respect, containing considerable quantities of pipitzahoic acid in an almost pure state, was found the following species:



*Crystals of pipitzahoic acid, magn. 160 diam.*

Prepared by precipitating the  
alcoholic solution with water.

By evaporating the alco-  
holic tincture of the root.

*Perezia Wrightii*, Gr. This is a robust plant from 1 to 2 feet in height, with a woody tap root on all sides covered by a dense cushion of long silky dark brown hairs; freed from these, it is found more or less contorted, over an inch long and  $\frac{3}{8}$  of an inch in thickness. The transverse section shows, when examined under the microscope, numerous fibro-vascular bundles, separated by the intervening cortical substance. Stem erect, simple below, corymbosely branched above, smoothish, the lower part covered by the leaves which are membranaceous, 3 to 4 inches long, 2 to 3 inches broad, glabrous, strongly ribbed, unequally serrated and spinulose denticulate, closely sessile, with an auriculate or cordate base. Flowering heads numerous, small, with short, glandular hairy, subulately bracted pedicels, terminating in dense clusters the branches of the open, nearly naked corymb, containing 8 to 10 flowers. Involucre small, scarcely exceeding, in length, the fruit; the scales to the number of 12 to 15, are rather membranaceous, greenish, viscid puberulent, the innermost oblong linear, the exterior shorter, oblong-ovate. Akenes 5 ribbed, somewhat fusiform, bearing a pappus of copious, soft, white, capillary bristles.

The root is of a bitterish, not disagreeable taste. The alcoholic extract is of a pure deep yellow color; treated with an excess of boiling water it yields an abundant crystalline, golden yellow precipitate of pipitzahoic acid, which, by the addition of a dilute solution of caustic alkali shows the characteristic splendid reaction already described. From these observations it is evident that the roots of *Perezia Wrightii* will serve as a fit material for the preparation of this acid in larger quantities.

According to Prof. Gray,<sup>1</sup> *Perezia runcinata* possesses thick, tuberous roots similar to those of the dahlia. Unfortunately I could not procure specimens of this plant, found nearest to the limits of our eastern North American flora. I am, however, in hope to obtain them before the close of another season, as well as a sufficient supply of the roots of *Perezia Wrightii* for the preparation of larger quantities of this highly interesting and peculiar organic constituent of the North American *Perezias*, so as to be able to study closer its properties, and obtain some light in regard to the uses to which it might possibly be applied to in the laboratory and in the arts, as well as to permit of a closer investigation of its value as a remedial agent.

*Mobile*, December, 1883.

<sup>1</sup> Rep. Mexic. Bound. Sur. Botany.

## PIPITZAHOIC ACID OR VEGETABLE GOLD.

BY THOMAS GREENISH, F.C.S.

The author refers to the root and the acid exhibited by Mr. Vigener, of Bieberich, at the meeting of the German Apotheker Verein, in 1883; among the specimens of acid was one in fine flakes, the result of sublimation, and of a brilliant golden yellow color, hence the name "vegetable gold" applied to this product. The drug was first noticed in Europe in 1855, when Dr. Schaffner, a young German pharmacist, obtained of Dr. Leopold Rio de la Loza, Professor of Chemistry and Pharmacy in Mexico, a sample of the acid, which was subsequently analyzed by M. C. Weld ("Annal. Chem. Pharm.," xcv, 188).<sup>1</sup> In his report on the chemical and pharmaceutical products in the Philadelphia Exhibition, Mr. J. R. Jackson mentions pipitzahoic acid and pipitzahuina and briefly describes the former.<sup>2</sup>

The author then gives the following description of specimens presented by Mr. Vigener:

The roots, as furnished me, were in pieces from 8 to 10 cm. long and 2 mm. thick, externally of a brown or reddish brown color, more or less furrowed longitudinally on the surface, apparently through the shrinking of the root in the process of drying; its taste was decidedly bitter, leaving a pungency on the tongue which remained after the bitterness had passed off, and this pungency was somewhat persistent.

In a transverse section of the root the yellow spots of pipitzahoic acid were visible to the naked eye, and more distinctly seen in their relation to the other parts when the section was slightly magnified with a lens. The outer cortical layer consists of a double row of thickened tabular cells, tangentially disposed and deeply colored; this is followed by a layer, several cells deep, of collenchymatous tissue passing inward to the fundamental parenchyma of the root. The

<sup>1</sup> A notice of the drug is also contained in "Compt. Rend.," xlii, 873, 1072. Ramon de la Sagra refers the root to *Dumerilia* (*Perezia*, Gray) Humboldtii, Lessing, and describes the product as riolozinic acid.—EDITOR AMER. JOUR. PHAR.

<sup>2</sup> The Mexican Catalogue of the Exhibition of 1876 gives the following information:

Trixis Pipitzahoac, *Schaffner*, "Pipitzahoac." In the valley of Mexico and in the western mountains. The rhizomes and roots contain a resinous substance, which Mr. L. Rio de la Loza has called *pipitzoic acid*. It is used as a drastic in a dose of from 4 to 8 grains.—EDITOR AM. JOUR. PHAR.



pipitzahoic acid is contained in secreting cells, in groups of from three to five; the acid is in yellow lumps of a crystalline structure. These depositories of the acid, striking in the entire section, are arranged in a circle and correspond to the fibrovascular bundles. Stellate spots are scattered throughout the fundamental tissue from the collenchyma to the centre of the root and are due to certain cells only of the tissue becoming thickened by secondary deposit, and converted into sclerenchymatous or stone cells with laminated structure, the intercellular spaces being filled with a dark colored deposit. These cells are found mostly single, but occasionally in groups of two, three or more. A longitudinal section shows, in addition to the relative positions of the cells referred to, the more characteristic constituents of the root as pipitzahoic acid, and the dark deposit around the long stone cell traversing the length of the root.

Most of the parenchymatous cells contain grains of inulin, *Perezia* being one of the Compositæ, and containing inulin as the equivalent of starch present in the plants of other orders.

This brief account of the microscopical structure of the *Perezia* root will serve to make the more salient features in its histology intelligible. The quantity of root placed at my disposal was only 2 gm., and that of acid 0.33 gm.; it must, therefore, be obvious that few experiments beyond those afforded by micro-chemistry could be undertaken.

A transverse section of the root in which the lumps of pipitzahoic acid were visible were subjected to micro-sublimation on a microscopic glass slide, and at a little over 100°C. the acid sublimed on the cover-glass in yellow crystals. An alcoholic tincture of the root, yellow from solution of the acid, brought into contact with a dilute solution of caustic alkali or alkaline carbonate, developed that fine purple color which induced Herr Vigener to suggest a probable future for the acid as a color indicator in chemical investigations. The tincture on evaporation yielded crystals of pipitzahoic acid.

I was unable to satisfy myself as to the character of the intercellular dark deposit. It was not affected by alcohol, ether, benzol, chloroform or turpentine; neither did caustic alkali dissolve it; it was decomposed by nitric acid. If from the negative results of these experiments I may be allowed to offer an opinion, it would be that the deposit in question is dried latex.

When the pipitzahoic acid first came under my notice it occurred to me as probable that its formation might be due to a degradation of

tissue and a rearrangement of its elements similar to that which takes place in araroba or goa powder; but a careful anatomical investigation does not support that view. It appears to be a true secretion in certain cells occupying the same relative position throughout the root, and unaccompanied by any of that breaking down of the surrounding cells so marked in the microscopical investigation of araroba.

The *Perezia* may prove a valuable medicinal plant, but to determine that point there are yet wanting those careful therapeutic investigations which should precede the appearance in general practice of any new drug, a series of well conducted experiments which very few seem capable of conducting, and for the results of which still fewer have the patience to wait.—*Phar. Jour. and Trans.*, March 1, 1884.

## ON KEPHIR.

BY PROFESSOR H. STRUVE.

*Translated from Berichte d. Deutschen Chemischen Gesellschaft, 1884,  
p. 314-316.*

Kephir is a beverage which is prepared by a peculiar process of fermentation from the milk of cows and other animals. It has been in use from time immemorial by the inhabitants of the northern declivities of the high Caucasian mountain range, to whom it possesses the same importance as koumis does to the nomades of the southeastern steppes of Russia. The last-named beverage was for the first time brought to the notice of the scientific world in 1784, and since then it has been frequently the subject of investigations, but only within a few decades has it attained greater importance as a remedy.

On the other hand, kephir was, even in Russia, totally unknown until two years ago, although in 1867 Dr. Sipowitsh had made a short communication on this subject to the Caucasian Medical Society, which remained buried in the archives of the latter. Ten years later, in 1877, Dr. Shublowski published a more detailed paper on kephir which, however, failed to direct the attention of science or that of the public towards this new beverage; the proper impulse was first given from Moscow in 1881, almost a century after the first notice of koumis.

On December 1st, 1881, Ed. Kern read a paper before the Imperial Society of Naturalists at Moscow ("Bull. Soc. Impér. des Natur. de Moscou," 1881, p. 141) on "Kephir, a new milk ferment from the

Caucasus," which he had collected during his travels. The requisite investigations had been made by Ed. Kern under the supervision and in the laboratory of Prof. Goroshaukin. The result is that, within the last two years, kephir was not only introduced as a medicine from the southern to the northern section of Russia; but that also a number of papers and pamphlets on this subject has been published. During the latter part of the past year kephir has also been noticed in other countries, among others by Prof. Dr. F. Cahn, at the meeting held December 13, by the section for Natural Sciences of the Silesian Society at Breslau. Kephir has already become an article of speculation, is procurable in commerce, and will doubtless be further scientifically investigated. The narrow circle in which for centuries kephir has been harbored with almost religious piety, has been broken, and it has become public property notwithstanding the method of its preparation is still surrounded with a certain mystery, depending upon the so-called kephir-grains, the new milk ferment of Kern. This can only be procured from the mountain tribes; but after it has been obtained, kephir may be prepared with the requisite precautions, at all times, in winter or in summer.

This present mystery concerning the origin and nature of the kephir-ferment invites further investigations, and it will doubtless not be a long time before the preparation of kephir in all its details will have been ranged with the known phenomena of fermentation in general. Then, most likely, this simple beverage and remedy of the mountain tribes of the high Caucasus will be accorded an important position among the domestic and general remedies, more particularly as towards koumis. But years of observation will be required to determine its true value; at present kephir is beginning to become a fashion remedy.

The author has undertaken the chemical investigation of kephir with the view of applying to it the results of his protracted investigations of milk, and of determining the changes produced by this ferment; although more difficult and complicated than expected, he hopes in the near future to be able to report his results.

*Tiflis*, January 30, 1884.

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**Antibacterid**, an antiseptic patented in Germany, is prepared from 338 parts of borax, 124 parts of boric acid and 198 parts of glucose, dissolved in a little water; the solution is evaporated until a solid mass is left.

## RELATIVE ABSORPTION OF NEUTRAL SALTS IN THE HUMAN STOMACH.

BY W. JAWORSKI.

These experiments were carried out under normal physiological conditions in a healthy man who drank the solutions (500 cc.) of chemically pure salts and remained at rest until the residual fluid was recovered from the stomach by means of an aspirating pump specially devised for the purpose. This was then submitted to analysis, and the changes in the percentage of the salts determined.

These investigations showed that in the human stomach the absorption of individual salts is different, and dependent upon their chemical composition.

The acid carbonates (magnesium and sodium) underwent the greatest, the chlorides (magnesium, potassium, sodium, and ferric) the least absorption, and the sulphates (sodium and magnesium) between these extremes.

The difference in the absorption of two salts is the greater the longer the solution is present in the stomach.

The presence of acids in the stomach hastens absorption, and the difference in the absorption of individual salts becomes more pronounced. Carbonic acid especially accelerates absorption, which, on the other hand, is hindered by alkalinity of the contents of the stomach.

The presence of common salt neither accelerates absorption nor increases the gastric secretion; the action is negative in both directions.

The secretion of chlorine is greater in proportion to the alkalinity of the saline solution and the length of time the latter remains in the stomach. Acid sodium carbonate excites the secretion of the gastric mucous membrane less than the neutral carbonate.

When distilled water is introduced into the stomach, secretion of acid contents (hydrochloric acid) ensues, and that in proportion to the lowness of its temperature.

Should a salt undergo dissociation of its acid and base in the stomach, these are not absorbed in the ratio of their combining proportions. Saline solutions may be found on aspiration still present in the stomach an hour after their introduction, whereas the same quantity of distilled water disappears almost entirely within half an hour



afterwards. From these results certain practical suggestions of clinical importance may be derived.

In the first place the administration of salts in the form of acid carbonates, as with an excess of carbonic acid, is advantageous, for absorption takes place more quickly, and with a more rapid emptying of the stomach there is less irritation of its mucous membrane. The author observed the action of  $\text{CO}_2$  and of the acid carbonates, as also of  $\text{CaH}_2\text{CO}_3$  in a series of experiments with acidulous mineral waters.

Alkaline fluids, on the other hand, delay absorption and the evacuation of the stomach, and the gastric walls are stimulated to secretion more strongly than by other solutions. Acids favor absorption and rapid evacuation of the gastric contents.

The presence of common salt in the stomach does not appear to offer the advantages in regard to digestion which have heretofore been ascribed to it, neither stimulating to greater excretion of the gastric acid (this remark may perhaps not apply to pepsin) nor to evacuation of its contents. In the moderation of the activity of the gastric walls by alkaline agents may probably be found an explanation of the therapeutic results of certain remedies, such as magnesium carbonate, sodium carbonate, and certain metallic oxides, in relieving the pain of cardialgia.

The introduction of salts in the form of chlorides in neutral solution is, as regards gastric absorption, not advantageous, and still less so in the case of neutral carbonates, which are absorbed only in proportion as their transformation into chlorides takes place.

The difficult absorptivity of ferrous chlorides is especially to be noted from a medical point of view, and considering the facility of absorption of acid carbonates, it may be assumed that an acid ferrous carbonate would prove the most absorbable of all iron preparations.—*Jour. Chem. Soc.*, Feb., 1884; *Zeitschr. Biol.*, xix, 397-445.

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**Combination of Morphine with Acids in Opium.**—D. B. Dott states that an aqueous extract of opium contains sulphuric acid sufficient, and meconic acid insufficient to combine with the whole of the morphine present; but it contains also inorganic and organic bases with which the sulphuric acid will unite in preference to the morphine, the remainder of this acid being not sufficient to combine with all the morphine. This alkaloid, therefore, exists in opium both as sulphate and meconate, possibly as acid meconate.—*Phar. Jour. and Trans.*, November 17, 1883, pp. 389, 390.

## THE PREPARATION OF A STANDARD EXTRACT OF NUX VOMICA.<sup>1</sup>

BY WYNDHAM R. DUNSTAN,

*Assistant Lecturer in Chemistry and Physics to the Pharmaceutical Society  
and Demonstrator of Practical Chemistry in the School of Pharmacy; and*

F. W. SHORT,

*Assistant Demonstrator of Practical Chemistry in the School of Pharmacy.*

In previous communications to this Society and to the British Pharmaceutical Conference we have described the results of a chemical investigation of *Strychnos Nux vomica* and its pharmaceutical preparations. Processes for the estimation of the total alkaloid in the nux vomica seeds, in the tincture and in the extract have been devised, and a method for the quantitative separation of strychnine and brucine has been proposed. At the last meeting of this Society the results of some experiments were communicated relative to the extractive power of alcohol of various degrees of dilution for the alkaloidal salts which are contained in nux vomica. Now our analyses of authentic and commercial specimens of nux vomica have shown that different specimens vary very considerably in alkaloidal content, and a very serious want of alkaloidal uniformity has been shown to obtain in the instance of commercial tinctures and extracts of nux vomica. In the present papers it is intended to apply the results of the above investigation in the preparation of a standard extract and tincture of nux vomica, that is, an extract and tincture of nux vomica which shall contain a definite and constant quantity of total alkaloid. Perhaps the most obvious method of attaining such a result would be in the first place to obtain a specimen of nux vomica which contained a known percentage of total alkaloid, and completely to exhaust a certain weight with a definite volume of alcohol. There are, however, certain practical difficulties connected with the complete exhaustion of nux vomica by a definite volume of spirit, and still greater difficulties in obtaining nux vomica constant in percentage of alkaloid, that led us to work upon somewhat different lines.

It is proposed at the outset to take a good commercial specimen of nux vomica in powder. We have previously shown that the powdered nux vomica at present in commerce is free from adulteration, and hence this substance can be used with advantage for the present pur-

<sup>1</sup> Read at an Evening Meeting of the Pharmaceutical Society, Feb. 6, 1884.

pose. In case of a necessity arising for obtaining *nux vomica* seeds in fine powder it should be noted that we have in a previous paper given a method for easily effecting this (*Phar. Jour.*, [3], xiii., 1053). Commercial specimens of *nux vomica* contain, on an average, 3 per cent. of total alkaloid. The seeds having been obtained in a fine state of division they are extracted by percolation with a definite volume of alcohol of specified strength. The percolate is then measured and the quantity of total alkaloid is estimated in a given volume of it. The volume of this percolate, which contains a quantity of alkaloid corresponding to the percentage of alkaloid which should be present in the extract is then taken and evaporated to a definite weight. We have fixed 15 per cent. as the quantity of total alkaloid which shall be contained in the standard extract of *nux vomica*; this decision is based upon a careful consideration of the results of our analysis of the extracts of *nux vomica* which are now used in medicine, which results were communicated at the last meeting of this Society.

It will be necessary now to consider some important practical questions connected with the actual preparation of the extract. It cannot, in the first instance, be too strongly insisted that the seeds should be in a very fine and uniform state of division, for unless this is the case, thorough and uniform extraction is impossible. In the extraction of the seeds we recommend the employment of a dilute alcohol, made by adding 25 volumes of water to 100 volumes of rectified spirit, for we have previously shown that alcohol of this strength has the highest solvent power for the alkaloidal salts which are contained in *nux vomica*. Extract of *nux vomica* is usually made by boiling the *nux vomica* with alcohol until exhausted; but it seemed to us that if the *nux vomica* could be exhausted with a comparatively small quantity of spirit without the aid of heat there would be a distinct advantage, especially in the manufacture upon the small scale. Experiments were therefore made in this direction. Thirty grams of *nux vomica* in impalpable powder were packed in a stoppered percolator, mixed with 60 cubic centimetres of alcohol (100:25), and allowed to macerate for twelve hours. Percolation was then commenced, and when it had ceased an additional 60 cubic centimetres of the alcohol were poured upon the marc. When this had ceased to pass through the percolate measured 80 cubic centimetres. Sixteen cubic centimetres were analyzed by the process which has been previously described (*Pharm. Jour.* [3], xiv. 441), and it was found that the 80 cubic centimetres of

alcohol had extracted 0.735 gram of alkaloid. A portion of the specimen of *nux vomica* employed had been previously assayed and found to contain 2.66 per cent of total alkaloid; 30 grams consequently contained 0.8 gram of total alkaloid, so that 92 per cent. of the total alkaloid had been extracted by the 80 cubic centimetres of alcohol. To the mare were now added another 60 cubic centimetres of the alcohol; the percolate was analyzed and found to contain 0.041 of alkaloid, making a total of 0.775 gram of total alkaloid extracted from 30 grams of *nux vomica*, which contained 0.8 gram of total alkaloid.

These experiments were now repeated upon a larger scale, and the quantity of extract as well as of total alkaloid was estimated in each successive fraction of the percolate. One pound of finely powdered *nux vomica* was intimately mixed with one pint of alcohol (100 : 25) and allowed to macerate for twelve hours. Percolation was then commenced and continued with more alcohol, portions of the successive fractions of the percolate being assayed for total alkaloid. A total quantity of four pints of alcohol was employed. The results were as follows:

One pound of *nux vomica*, containing 189 grains of total alkaloid, was extracted with 4 pints of dilute alcohol (100 : 25).

Fractions of percolate.	Volume of fraction.	Amount of extract containing 22.67 per cent. of moisture.	Amount of total alkaloid (strychnine and brucine)
First fraction.....	26 ounces	856 grains	125 grains
Second fraction.....	16 ounces	220 grains	32 grains
Third fraction.....	10 ounces	74 grains	11 grains
Fourth fraction.....	10 ounces	20 grains	3 grains
Total percolate.....	62 ounces	1,179 grains	171 grains

These results show that, proceeding in the above way, *nux vomica* is practically exhausted by four times its weight of alcohol of the specified strength. It will be noticed that maceration and percolation were adopted, principally because it was found that the first fraction of the tincture made by direct percolation deposited, after a short time, a flocculent precipitate that was not permanently redissolved by heat. No such result occurred when maceration was adopted, although the strong tincture if kept for some time, especially in cold weather,



deposits a substance which is apparently a fatty acid, and consequently contains no strychnine or brucine, and by gently heating is permanently redissolved. It now remained to prepare the extract from this strong tincture in which the amount of alkaloid was known. After a number of preliminary experiments it was found that 9 ounces (fluid) of this strong tincture, containing 10 grains of total alkaloid, were converted into an extract of suitable consistence by evaporating upon the water-bath until the product weighed 66·6 grains; that is, contained 15 per cent. of total alkaloid. In order to confirm the calculated alkaloidal content of this extract 1 gram was assayed and yielded 0·151 gram of total alkaloid, thus agreeing admirably with the calculated percentage (15 per cent.). We then prepared this standard extract from different specimens of nux vomica, representing high and low percentages of total alkaloid, and found that in all cases it was feasible to prepare a product having all the physical properties of a good extract and containing 15 per cent. of total alkaloid by the direct evaporation of the strong tincture.<sup>1</sup> The following is a description in official phraseology of the process which we propose for the preparation of a standard extract of nux vomica.

Take of —

Nux vomica, in fine powder.....	1 pound.
Rectified spirit.....	64 fluidounces.
Distilled water.....	16 fluidounces.

Mix the spirit with the water and make the nux vomica into a paste with one pint of the mixture. Allow this to macerate for twelve hours, then transfer to a percolator and add another pint of the mixture. When this has percolated, pour on the remainder of the diluted spirit in successive portions; press the marc, filter the expressed liquid and add it to the percolate. Take of this liquid one fluidounce and estimate the amount of total alkaloid in the following way: Evaporate almost to dryness over a water bath, dissolve the residue in two fluid drachms of chloroform and half a fluid ounce of dilute sulphuric acid, with an equal bulk of water, agitate and warm gently. When the liquids have separated draw off the chloroform and add to the acid liquid excess of solution of ammonia and half a fluidounce of chloro-

<sup>1</sup> Of course such standard extracts prepared from seeds containing different percentages of alkaloid will not have the same consistence; but this variation in consistence is not sufficiently considerable to be of any practical moment.

form, well agitate, gently warm, and after the liquids have completely separated transfer the chloroform to a weighed dish, evaporate over a water-bath and dry for one hour at 212° F. Allow the residue of total alkaloid to cool and then weigh. Take of the percolate as much as contains 131½ grains of total alkaloid and evaporate over a water-bath until the extract weighs two ounces. This extract will contain 15 per cent of total alkaloid.

Ten grains of this extract when treated in the following manner should yield one and a half grains of total alkaloid. Dissolve the extract in half a fluid ounce of water with the aid of a gentle heat and add a drachm of carbonate of sodium previously dissolved in half a fluidounce of water; add half a fluidounce of chloroform, agitate, warm gently and separate the chloroform. Add to this half a fluid-ounce of dilute sulphuric acid with an equal bulk of water, again agitate, warm and separate the acid liquid from the chloroform. To this acid liquid add now an excess of ammonia and agitate with half a fluidounce of chloroform; when the liquids have separated transfer the chloroform to a weighed dish and evaporate the chloroform over a water-bath. Dry the residue for one hour and weigh.—*Pharm. Jour. Trans.*, February 9, 1884.

## THE PREPARATION OF A STANDARD TINCTURE OF NUX VOMICA.<sup>1</sup>

BY WYNDHAM R. DUNSTAN,

*Assistant Lecturer in Chemistry and Physics to the Pharmaceutical Society  
 and Demonstrator of Practical Chemistry in the School of Pharmacy; and*

F. W. SHORT,

*Assistant Demonstrator of Practical Chemistry in the School of Pharmacy.*

In the previous paper we have proposed a process for the preparation of a standard extract of *nux vomica*, containing 15 per cent. of total alkaloid. In considering a feasible method for preparing a standard tincture of *nux vomica*, we were led by our former results to two suggestions. First, the dilution with alcohol of the assayed percolate (the method of producing which has been described in the former paper) to a definite degree, corresponding to a given percentage of total alkaloid, and second, the solution of a definite quantity of the standard extract

<sup>1</sup> Read at an Evening Meeting of the Pharmaceutical Society, Feb. 6, 1884.

in a given volume of alcohol. We propose that the standard tincture of *nux vomica* shall contain 0.24 per cent. of total alkaloid, that is 1 grain of total alkaloid in 1 fluid ounce of tincture. This proposal results from a comparison of the analyses which we have already published of the various tinctures of *nux vomica* now being used in medicine, and represents the alkaloidal content of a good commercial specimen. The mode of preparing the standard tincture by the first method is simple in procedure and eminently satisfactory in result. An experiment was made by taking that volume of the strong percolate, assayed as before described, which contained 20 grains of total alkaloid, this was diluted to one pint with alcohol (100:25). A pale yellow perfectly clear tincture was obtained, every ounce of which contained 1 grain of total alkaloid. This tincture did not deposit or otherwise change after being kept for one month. A practical objection perhaps attaches to this method, as one for general use, which must be allowed to have some weight. It involves the preparation of two tinctures of *nux vomica*, the one strong, the other weak, and the substitution of the one for the other in dispensing would be attended with grave results; this perhaps is an objection to recommending the process for general use, although it is a point on which we speak with some reserve. A number of experiments were then made in connection with the second method. It has been already shown that with ordinary extract of *nux vomica* there is no very easy method of obtaining a solution in alcohol which is at once perfect and permanent (*Pharm. Jour.* [3], xiv., 442). But it now seemed probable, having prepared an extract by exhausting the *nux vomica* with alcohol of definite strength and evaporating on a water-bath, that such an extract would redissolve in alcohol of the same strength that had been used in its production. One gram of the standard extract of *nux vomica*, containing 15 per cent. of total alkaloid, was mixed with 60 cubic centimetres of alcohol (100:25). By stirring the whole of the extract was dissolved, and the perfectly clear tincture deposited a very small quantity of a white sediment after one month.<sup>1</sup> Some of the sediment was examined and contained no alkaloid. Thus a standard tincture of *nux vomica* could also be readily prepared by the solution of the standard extract in alcohol of certain strength. The tincture prepared as above detailed should contain 0.24 per cent. of total alkaloid and to confirm this the tincture was assayed and yielded 0.2402 per cent. of

<sup>1</sup> The extract, it should be noted, will not wholly dissolve in rectified spirit

total alkaloid, thus coinciding with the calculated result. The standard tinctures prepared by the two processes which have been described contain, of course, the same percentage of total alkaloid. They differ in color, that prepared by the first process being pale yellow, by the second, light brown; the latter also deposits very slightly, while the former is perfectly stable. For reasons already stated, we incline to recommending the latter process for general use; the former would probably be preferred by the manufacturer upon the large scale. The following is a description of both the processes which we have devised for the preparation of a standard tincture of nux vomica containing 0.24 per cent. of total alkaloid:

I. Take of—

Nux vomica, in fine powder.....	1 pound.
Rectified spirit.....	64 fluidounces.
Distilled water.....	16 fluidounces.

Mix the spirit with the water and make the nux vomica into a paste with one pint of the mixture. Allow this to macerate for twelve hours, then transfer to a percolator and add another pint of the mixture. When this has percolated, pour on the remainder of the diluted spirit in successive portions; press the marc, filter the expressed liquid and add it to the percolate. Take of this liquid 1 fluid ounce and estimate the amount of total alkaloid in the following way: Evaporate almost to dryness over a water-bath, dissolve the residue in 2 fluid drachms of chloroform and half a fluidounce of dilute sulphuric acid with an equal bulk of water; agitate and warm gently. When the liquids have separated draw off the chloroform and add to the acid liquid excess of solution of ammonia and half a fluidounce of chloroform; well agitate, gently warm and after the liquids have completely separated transfer the chloroform to a weighed dish. Evaporate over a water-bath, and dry for one hour at 212° F. Allow the residue of total alkaloid to cool and then weigh.

Take that quantity of the percolate which contains 20 grains of alkaloid and dilute to one pint (imperial) with a mixture of 4 parts by volume of rectified spirit with 1 part by volume of distilled water. This tincture will contain 0.24 per cent. by volume of total alkaloid and 2 fluidounces of it when estimated, in the same manner as the percolate, should yield 2 grains of total alkaloid.

II. Take of—

Standard extract of nux vomica.....	133 grains.
Rectified spirit.....	16 fluidounces.
Distilled water.....	4 fluidounces.



Mix the spirit with the water and dissolve the extract in the mixture. One fluidounce of this tincture will contain one grain of total alkaloid.

In concluding this the last part of the report, we wish to gratefully acknowledge the valuable assistance which we have from time to time received from Professor Redwood, who has closely followed the progress of the investigation, and made many fruitful suggestions which have contributed to its successful result. We also wish again to thank Professor Atfield for having allowed the work to be carried on in the Laboratories of the Pharmaceutical Society. The investigation has been largely aided by a grant from the Research Fund of the British Pharmaceutical Conference.—*Pharm. Jour. Trans.*, February 9, 1884.

## A NEW REACTION AND TEST FOR ATROPINE AND THE MYDRIATIC ALKALOIDS.<sup>1</sup>

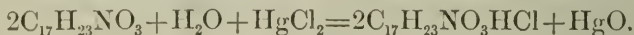
BY A. W. GERRARD, F.C.S.,

*Teacher of Pharmacy to University College.*

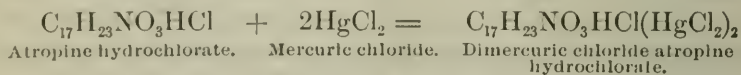
Whilst studying the behavior of atropine towards mercuric chloride I was somewhat surprised to find on mixing hot alcoholic solutions that they gave a yellow precipitate, which on boiling became red. On diluting the mixture with water a further amount of yellow precipitate was obtained, which also changed to red on boiling.

The precipitate separated, washed and dried, was found on analysis to be mercuric oxide, with a small trace of mercurous oxide.

The reaction representing the first change can be shown by the following equation :



In addition to the above reaction, I find that a second one takes place simultaneously. This second reaction is between the atropine hydrochlorate and two more molecules of the mercuric salt yielding the following combination :



On cooling and setting aside a few hours this compound separated in tufts of crystalline plates.

<sup>1</sup> Read at an Evening Meeting of the Pharmaceutical Society, March 5, 1884.

It is seen in the first equation that water is essential to the production of the mercuric oxide, this I have proved by mixing absolute alcoholic solutions, also ethereal solutions of the two salts, but no reaction took place until water was added. As commercial alcohol contains traces of water a slight reaction may follow its use. The above experiment was repeated on hyoscyamine, daturine, duboisine, and homatropine, with the same result, thus affording additional proof of the unity of the mydriatic alkaloids.

The composition of the above double salt was established as follows : 500 milligrammes of the carefully dried salt were dissolved in water, and potassic hydrate added in slight excess ; the resulting precipitated mercuric oxide was separated, dried and weighed, then calculated as Hg ; it gave 228 milligrammes or 45·6 per cent. The filtered solution and washings from the mercuric oxide were faintly acidified with acetic acid, and the chlorine estimated with argentic nitrate, using potassic chromate as indicator ; I thus obtained 99·4 Cl or 19·9 per cent. The difference of the above quantities being assumed as atropine would leave 34·5 per cent. for that body, so that analysis and formula\* percentages may be thus compared :

	Percentages. Theory.	Percentages. Found.
Mercury.....	46·1	45·6
Chlorine.....	20·4	19·9
Atropine.....	33·3	34·5

To further prove these results another analysis was made as follows : 500 milligrammes of the salt were dissolved in water, and treated with H<sub>2</sub>S in excess, and the precipitated mercuric sulphide washed, dried and weighed gave mercury equalling 45·9 per cent. The filtrate and washings were warmed for some time until quite free from H<sub>2</sub>S ; it was then made neutral with potassic hydrate and the chlorine estimated as above. I now obtained 20·7 per cent. Cl. This result thus confirms the previous analysis.

In addition to the foregoing, I have prepared hydrochlorate of atropine, and treated it with two molecules of HgCl<sub>2</sub>, and thus obtained the same double compound.

Expecting to find other alkaloids to react in a similar manner, the same test was applied to as many alkaloids as were at my disposal ; in no case did I obtain a red precipitate. The following were examined : —Strychnia, brucia, morphia, codeia, veratria, aconitia, conia, gelseminia, coffea, theia, cinchonia, cinchonidia, quinia and quinidia. With most

of these I obtained white precipitates; the codeia and morphia became pale yellow on boiling; in many cases crystals of apparently new combinations separated.

For practically working the test, I recommend the following procedure: To a small portion of atropine in a test tube, add about 2 cc. of a 5 per cent. solution of mercuric chloride in 50 per cent. alcohol and warm gently; the precipitate will at once appear, and become brick-red in color. Like most alkaloidal reactions, I find there are certain limiting conditions necessary for the success of the test. It does not answer in dilute solutions, neither does it turn out well if the atropine be added to the mercury, but working as I have described the reaction is strongly marked.

In forensic analysis the above test will be of value, as hitherto no reliable chemical test for atropine has been known. This communication also shows, that under certain conditions, atropine, contrary to the general statement, behaves towards mercuric chloride not like ammonia, but similar to the hydrates of the alkali metals.—*Pharm. Jour. and Trans.*, March 8, 1884, p. 718.

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## LASERPITIN.

By R. KÜLZ.

The author has made an investigation to determine the nature of the bitter principle *laserpitin*, which is contained in the root of *Laserpitium latifolium*, or white gentian root, and to discover the connection (if any) which obtains between this substance and the bitter principles contained in other umbelliferous plants.

*Laserpitin*.—The finely sliced root was extracted by boiling with light petroleum, and on evaporating the solution *laserpitin* was deposited in crystals belonging to the monoclinic system. These were purified by recrystallization from light petroleum, and were found to contain no water of crystallization. *Laserpitin* melts at 118°, is insoluble in dilute acids or alkalis, but is easily soluble in chloroform, ether, benzene and carbon bisulphide. Concentrated acids decompose it, sulphuric acid dissolving it with the production of a deep red color. This same color is observed when *laserpitin* is boiled with concentrated hydrochloric acid, or with alcoholic potash.

A series of combustions of the pure *laserpitin* gave numbers point-

ing to the formula  $C_{15}H_{22}O_4$ . No chloride or bromide of laserpitin could be obtained, but an acetate,  $C_{15}H_{22}O_4\overline{AcOH}$ , crystallized in silky needles from a solution in acetic acid; even this salt was unstable. Several derivatives of laserpitin were obtained. An attempt to produce an acetyl derivative by the direct action of acetic chloride or acetic anhydride gave negative results.

When laserpitin is distilled with zinc dust or soda-lime, no benzene or other aromatic hydrocarbon is obtained, from which the author concludes that the molecule of laserpitin contains no compound constituted on the type of the closed carbon-ring.

The action of concentrated hydrochloric acid on an alcoholic solution of laserpitin gives rise to methylerotonic acid, and the action of concentrated sulphuric acid yields angelic acid.<sup>1</sup> When laserpitin is heated with dilute nitric acid, oxalic acid is one of the products. Ebullition with alcoholic potash yields angelic acid, and fusion with potassium hydroxide, methylerotonic acid.

*Monacetylaserpitin*,  $C_{15}H_{21}\overline{AcO}_4$ , may be obtained by the action of acetic anhydride on laserpitin in presence of anhydrous sodium acetate. It crystallizes in colorless needles, melting at  $113^\circ$ , and soluble in glacial acetic acid, alcohol, ether and chloroform, but insoluble in water.

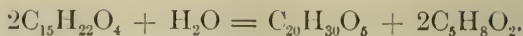
*Dinitrolaserpitin*,  $C_{15}H_{20}(NO_2)_2O_4\cdot H_2O$ , is obtained as an amorphous mass by the action of nitric acid on *laserpitin*. It melts at  $115^\circ$ , and is insoluble in water, but soluble in alcohol, ether, chloroform and glacial acetic acid.

*Bromolaserpitin*,  $C_{30}H_{39}Br_5O_8$ , obtained by the action of bromine on a solution of laserpitin in chloroform, crystallizes in rosettes, which are soluble in ether, alcohol, chloroform and glacial acetic acid; they melt at  $90^\circ$ .

*Laserin*,  $C_{20}H_{30}O_5$ , is a resinous substance (called by the author *lazerol*) which is produced when concentrated acids or alkalis act on laserpitin. It is insoluble in acids, but is dissolved by ether, alcohol, chloroform and glacial acetic acid. Its production, together with angelic acid, or methylerotonic acid, by the action of sulphuric or hydrochloric acids on laserpitin, is symbolized by the equation

<sup>1</sup> In another place the author mentions the production of angelic acid by the action of hydrochloric acid, and of methylerotonic acid by the action of sulphuric acid on laserpitin, but from internal evidence this is probably a mis-statement.





Attempts to produce derivatives of this body were unsuccessful. From these results the author infers that laserpitin is chemically different from pencedanin, ostruthin and athamantin, bitter principles which have been found in other umbelliferous plants.—*Jour. Chem. Soc.*, 1884.

## THE CHEMICAL COMPOSITION AND PROPERTIES OF A CRYSTALLINE PRINCIPLE OBTAINED FROM JAMBOSA ROOT.<sup>1</sup>

BY A. W. GERRARD, F.C.S.,

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The roots from which the principle under notice was extracted were handed to me in the summer of 1883 by Dr. Murrell, who received them from Messrs. Parke, Davis & Co., with the following information:

"The plant yielding these roots is probably the *Myrtus Jambosa*, L. (*Jambosa vulgaris*, DC.), cultivated on St. Maurice. The fruit has the circumference of a medium sized pear, a smell reminding of roses." In the same communication the plant is also mentioned as the "*Myrtus Jambosa Malaccensis*, Spr. Is at home in India and Otaheiti. The fruit is known as the rose apple, is frequently eaten, and the decoction of the bark used as an astringent in dysentery, gonorrhœa and leucorrhœa."

Since I received the root it has been figured in the *Therapeutic Gazette*, and examined and reported on by Dr. A. B. Lyons, who throws some doubt on a statement that it is the root of *Eugenia Jambosa*, and gives his opinion that the root and stem in general aspects resemble plants of the order *Piperaceæ*. Dr. Lyons also names his drug "Jambu assu," stating that it is indigenous to Brazil; but that name is applied in Chernoviz's "Medical Formulary of Brazil" to *Spilanthes oleracea*, the plants of which genus are mostly smooth annual branching weeds, and would scarcely produce roots 10 to 15 millimetres in diameter, the size of jambosa roots. It may turn out that the name "jambosa" is a generic one, used in the Brazils for drugs of the same character; hence its application to both the plants mentioned. I have been enabled, through the kindness of Mr. E. M. Holmes, to examine

<sup>1</sup> Read at an Evening Meeting of the Pharmaceutical Society, March 5, 1884.

some flowers of *Spilanthes oleracea*; they yielded me an oleoresin with properties similar to one obtained from *jambosa*, both being powerful sialagogues.

Dr. Lyons's examination of the root demonstrated that it contained a neutral crystalline principle, an alkaloid, a peculiar acid, and an oleoresin. An independent examination of my own gave similar results, except that I did not notice the alkaloid. I since find it is present, but the quantity is so minute that its study is not worth following.

The extraction of the crystalline principle, which is found only in the bark of the root, is extremely easy. My process was as follows: The bark was separated from the root, finely powdered and percolated with ether; the ether on evaporation gave an abundant crop of crystals, which by washing with ether and again crystallizing from ether were obtained perfectly white.

*Properties of Crystals.*—They are white and tasteless, melting at  $77^{\circ}$  C., becoming solid at  $60^{\circ}$  C.; soluble in cold ether, alcohol, and chloroform, and in hot petroleum ether. They are insoluble in cold water, but soluble on boiling, separating in crystals on cooling. With strong sulphuric acid they yield a bright green color, soon passing to a deep reddish-brown. With strong nitric acid they react violently, giving off nitrous fumes and forming an orange colored liquid, from which water precipitates a new compound. They gave none of the reactions of a glucoside, neither do they possess the character of weak resin acids.

*Analysis.*—Before combustion the crystals were submitted to fractional crystallization from various fluids; the various fractions proving of uniform composition the product was assumed to be pure. By exposure to dehydrating agents it scarcely lost weight.

Four combustions for carbon and hydrogen were made, giving as the average 60.585 per cent. C, and 7.584 per cent. H. Nitrogen being present it was twice estimated by the absolute method, and after the various corrections gave 7.2 per cent. N, leaving a difference of 24.631 O. These figures allow the construction of the formula  $C_{10}H_{15}NO_3$ , the theoretical percentages of which I have placed for comparison with those found—

	Analysis.	Theory.
C.....	60.585	60.91
H.....	7.584	7.6
N.....	7.2	7.1
O.....	24.631	24.39
	100.000	100.00

The name I propose for this substance is jambosin. Therapeutically it is of very little interest, as I have taken several doses without any apparent effect. The active principle of jambosa is no doubt to be found in the oleoresin, which is a powerful sialagogue, and deserving of further research.—*Pharm. Jour. and Trans.*, March, 1884.

## DETECTION AND ESTIMATION OF TRINITROPHENOL (PICRIC ACID).

BY G. CHRISTEL.

This paper contains an examination of the principal reactions of trinitrophenol made with a view to its qualitative detection and quantitative estimation. The aqueous solution of pieric acid is not precipitated by neutral solutions of lead or copper salts; neither is ammonium pierate, unless the solution is alkaline, when lead acetate gives a reddish yellow precipitate and copper sulphate a yellowish green precipitate in dilute solutions, and a bright green in concentrated solutions. A solution containing half a milligram of pieric acid in 5 cc. of water is not at once precipitated by a solution of cuprammonium sulphate, but on standing for 24 hours a distinct precipitate is obtained, which is insoluble in ammonia, but is decomposed by water. Solution of basic lead acetate is a very delicate test for pieric acid, yielding a bright yellow precipitate. A solution containing the tenth of a milligram of pieric acid in 5 cc. of water, gives after 12 hours a distinct precipitate, and a solution containing the twentieth of a milligram in 5 cc. of water a strong opalescence, which subsequently forms a distinct sediment. When this sediment is decomposed by the addition of 1 drop of sulphuric acid, and the solution is rendered alkaline with ammonium hydrate and evaporated to dryness, a residue is left which, when dissolved in a little water and warmed with a drop of potassium cyanide solution, gives a distinct red color. The yellow coloring matters of the bark of *Quercus tinctoria* (quercitron), and the root of *Broussonetia tinctoria* also give precipitates with basic and neutral lead acetate, but the precipitates do not give the reaction with potassium cyanide when treated as above described. An aqueous solution of methyl green precipitates solutions of pieric acid. The green precipitate dissolves in ammonia, forming a deep yellow solution, which is precipitated by basic lead acetate, and this precipitate gives the reaction with potassium

cyanide. This test cannot be applied for the detection of picric acid in beer, for 1 litre of beer which contained 5 milligrams of picric acid was not precipitated by a solution of methyl green. Solutions of picric acid are precipitated by stannous chloride, and if a small quantity of ammonia is added, the solution becomes red. The same reaction is obtained when a solution, prepared by adding potassium hydroxide to a solution of stannous chloride until the precipitate at first formed is redissolved, is added to a solution of picric acid. The red color is due to the formation of dinitroamidophenol (picramic acid): hydrogen and ammonium sulphides give a similar reaction. If a solution of picric acid or a picrate is acted on with zinc and dilute sulphuric acid, a yellowish red turbid solution is obtained, which, when poured off and mixed with alcohol, develops a green color, changing through blue to a violet-green. For the detection of picric acid in sweetmeats or other colored substances containing sugar, the potassium cyanide reaction can be applied directly; or the coloring matter may be extracted with alcohol, the residue from this solution, after dissolving in water, precipitated by lead acetate; and the potassium cyanide reaction obtained after decomposing the precipitate in the manner above described. For the detection of picric acid in wool or cellulose, the hydrochloric acid solution may be reduced by zinc, and the reaction with alcohol obtained. The substance may also be digested with ammonia, and the potassium cyanide reaction tried with this solution. The detection of picric acid in beer cannot be accomplished by means of lead acetate, on account of the other substances in the liquid, which are precipitated by this reagent; neither can the coloring matter be removed by animal charcoal, for this also retains the picric acid. For the detection of picric acid in beer, the author recommends the following method: 200 cc. of the beer are evaporated to a syrupy consistence on the water-bath, and then digested in a flask with 50 cc. of alcohol (99 per cent.), the mixture being allowed to stand for 24 hours, when it is filtered, and the residue washed with 31 cc. more alcohol. The mixed filtrates are evaporated to the consistence of a syrup and acidified with two or three drops of dilute sulphuric acid. The mixture is then extracted with five or six times its volume of ether, the latter removed, the solution again acidulated and extracted with ether. The ethereal solutions are spontaneously evaporated, and the residue dissolved in 5 or 10 cc. of water, the solution filtered, neutralized with ammonia, and tested by one of the methods above described. For the estimation of picric acid,



the author proposes a colorimetric method, based on the potassium cyanide reaction. The ethereal residue is diluted to 10 cc. with a little ammonia, 5 or ten drops of a 10 per cent. potassium cyanide solution added, and the liquid, after heating it to 80°, is diluted to 100 cc. with dilute ammonia. The color produced is compared with that given by a certain quantity of a standard solution of picric acid, 100 cc. of which contain 0.1 gram of pure picric acid, the operation being conducted in the same way.—*Jour. Chem. Soc.*, Feb., 1884; *Arch. Phar.*, (3) xxi, 190.

## NOTE ON LOGWOOD AS A TEST FOR METALS.<sup>1</sup>

BY ARTHUR WEDDELL.

For some years past I have been accustomed to examine potable waters for metallic impurities by means of the alteration produced in the coloring matter of logwood, and as it furnishes a delicate and convenient means of detecting their presence I have thought it worth bringing before this Society. When logwood is digested with alcohol an extract of a rich yellow color results, and this color is not changed on dilution with a pure, freshly distilled water. When added to ordinary samples of water, which contain calcium carbonate in solution, the yellow color is changed to a beautiful rose red, or if a metal be present to blue.

These changes are accounted for in the following manner: Hæmatoxylin, the ordinary coloring matter of logwood, is converted by oxygen, especially in the presence of alkalies, into an oxidized product known as hæmatëin, which gives a blue precipitate with salts of iron, lead, copper and many other metals, or if the solution be extremely dilute, a blue coloration only. This reaction is so delicate that 1 part of lead in 100,000 parts of water is easily detected, and with care 1 part in 200,000.

These changes do not occur in acid solutions. The method of using the test is extremely simple and consists in the addition of a few drops of a very dilute tincture of logwood to the sample under examination, care being taken that the quantity added is not too great, as a trace of metal may be thus overlooked, owing to the difficulty of observing the change of color in presence of a large excess of red coloring matter.

My own practice is to prepare an alcohol extract of logwood (strength

<sup>1</sup> Read at an Evening Meeting of the Pharmaceutical Society, March 5, 1884.

1 in 100) by maceration and to note how much of this is required to produce a distinct rose color in 100 cc. of distilled water rendered faintly alkaline with ammonium carbonate, or in 100 cc. of hard water free from metals.

This quantity of logwood solution is next added to 100 cc. of the water under examination, and the two tubes compared. If a rose color is developed, metals are absent, while a blue color indicates their presence.

More logwood may afterwards be added to each tube and the progressive differences noted, the blue color increasing in depth, or to a precipitate if much lead be present.

By adding sufficient lead solution of known strength to the pure water, so as to imitate the color in the second tube, as in Nesslerizing, an approximate idea of the amount of lead may be obtained, when it is known that no other metal is present; but I have not considered the reaction worth experiment in this direction, because the exact comparison is somewhat difficult and can hardly reach scientific accuracy.

The presence of free acids interferes with the reaction, and these, if present, must therefore be carefully neutralized and a slight excess of alkali added. Free carbonic acid gas should be removed by boiling, but I have never met with drinking water that required such treatment.

A variety of applications of this test will suggest themselves. Some years ago I recommended a convenient means of testing glycerin for lead and other metals, by adding the glycerin to water colored red with logwood. Soda water may be examined by boiling to free from  $\text{CO}_2$  and adding the logwood. Lemonade by adding a slight excess of pure alkaline carbonate and boiling. The mineral and vegetable acids may be examined by neutralizing carefully and adding the solution to water colored red with logwood.

My attention was first attracted to this test by observing that distilled water stored in a metal cistern when used to dilute a logwood tincture turned it to a dirty greenish color, and when this was mixed with tap water it turned blue. On examining the distilled water by the ordinary method, with  $\text{SH}_2$ , the presence of lead was detected, it having been dissolved from the solder used in the joints and in fixing the tap. As I have since met with this same condition of storage and impurity I think it would be well for those who store distilled water in such a manner to ascertain the absence of lead before using it.—*Pharm. Jour. and Trans.*, March 8, 1884, p. 717.

## ON THE PREPARATION OF PURE CHLOROPHYLL.

BY DR. A. TSCHIRCH.

All attempts hitherto made to prepare pure chlorophyll must be regarded as failures, their authors having started with the idea that chlorophyll is a comparatively stable substance, not altered by treatment with hydrochloric acid, etc. But an exact study of the alterations produced in the very characteristic spectrum of living leaves and of alcoholic chlorophyll solutions, by the action of various reagents, shows that pure chlorophyll is an extremely unstable body, which is decomposed even on treating the leaves with alcohol, even though no alteration of color is thereby produced. Hence it follows that the substances hitherto described as "chlorophyll" or "crystallized chlorophyll," and obtained either by treating chlorophyll extracts with strong hydrochloric acid, and precipitating the resulting blue solution (phyllocyanin) with excess of water<sup>1</sup> or with marble<sup>2</sup>—*i. e.*, by energetic chemical actions—or by absorbing the chlorophyll from its alcoholic solution with animal charcoal and washing it out with ether<sup>3</sup>—must be regarded as products of decomposition more or less remote from the original substance.

This conclusion is confirmed by spectroscopic examination, which shows that the crystallized chlorophyll of Gautier and Rogalski is identical with the chlorophyllan of Hoppe-Seyler ("Zeitschr. Physiol. Chem.," [3], 347), which, as I have shown ("Ber. der deutsch. botan. Gesellsch.," [1], 145), is a product of the oxidation of chlorophyll, and that the pure chlorophyll of Berzelius, Mulder and Pfaundler is identical with Frémy's phyllocyanic acid.<sup>4</sup> Here, then, are two bodies which agree perfectly in their absorption spectra, but—as shown by their behavior to caustic alkalis, which dissolve phyllocyanic acid,

<sup>1</sup> Berzelius ("Annalen," [27], 298).—Harting ("Pogg. Ann.," [96], 547).—Pfaundler ("Annalen," [115], 43).

<sup>2</sup> Mulder ("J. pr. Chem.," [33], 479).

<sup>3</sup> Gautier ("Comit. rend.," [89] 862).—Rogalski ("Compt. rend.," [90], 881), and Rôle de la chlorophylle dans l'assimilation.—"Inauguraldissertation," Krakau.

<sup>4</sup> "Compt. rend.," [61], 191.)—I here designated as *Phyllocyanic acid* only the body formed by decomposition of phyllocyanin, which is not identical with that which Frémy obtained by treating chlorophyll with barium hydroxide, magnesia or alumina, and decomposing the resulting salts with acids.

but not chlorophyllan—are nevertheless totally distinct one from the other.<sup>1</sup>

But it is not only towards concentrated acids that chlorophyll is so sensitive, for it is quickly decomposed even by weak acids,<sup>2</sup> always with formation of chlorophyllan. The constant presence of vegetable acids in the cells of the leaf explains, therefore, the rapid decomposition of chlorophyll tinctures, which, as may be shown spectroscopically, takes place even during the preparation of the solution, and goes on till the whole of the chlorophyll is converted into chlorophyllan, as evidenced by the change of color of the liquid from green to yellow. Hence all attempts to obtain the coloring matter in the pure state from chlorophyll solutions, either by precipitation with saline solutions, as I formerly proposed (*loc. cit.*, p. 181), or by separation with benzene, carbon sulphide, etc., fail in their object, inasmuch as the coloring matter is decomposed by the accompanying substances, even during the process of extracting it from the leaves.

Equally unavailing have been the attempts made to prepare the pure coloring matter by saponification of chlorophyll extracts. Chautard, ("Compt. rend.," [76], 570) has drawn attention to the differences between the spectroscopic characters of these alkaline solutions of chlorophyll and those of chlorophyll tincture. I myself have also further studied the action of alkalis, and have found that this treatment always yields products of decomposition, recognizable as such by their spectroscopic characters.

According to the present state of our knowledge, we must regard as pure chlorophyll the product whose absorption spectrum agrees with that of living leaves, as regards both the positions of the individual bands and likewise their breadth and intensity. Such a body I have obtained by a reduction of chlorophyllan, a substance easily obtained in the crystalline state by the action of zinc dust on alcoholic solution of chlorophyllan at the heat of the water-bath.

[The author then describes the absorption spectra of this emerald-green body and of living leaves, and continues:]

<sup>1</sup>The spectroscopic behavior of these two bodies shows, therefore, that a body may undergo chemical alterations not recognizable by spectroscopic observation.

<sup>2</sup>Compare also Kraus, "Zur Kenntniss der Chlorophyllfarbstoffe und ihrer Verwandten."—Stuttgart, 1872. Sachsse, "Die Farbstoffe, Kohlehydrate und Proteinsubstanzen."—Leipzig, 1877.



Pure chlorophyll prepared as above forms blackish-green drops, which have not yet been made to crystallize. It dissolves with great facility in alcohol, ether and benzene, easily also in oils both fatty and volatile, sparingly in fused paraffin, not at all in water. It is converted by dilute acids into yellow chlorophyllan, by strong hydrochloric acid into blue phyllocyanin, and is resolved by potash lye into an emerald-green substance which dissolves readily in water, forming an emerald-green strongly fluorescing liquid, externally very much like chlorophyll solutions, and a yellow body which may be extracted by ether from the aqueous solution. The alcoholic solution of pure chlorophyll is much less sensitive to light than ordinary tincture of chlorophyll. I regard this pure chlorophyll as identical with the chlorophyll of living plants, and reserve to myself the right of examining it further.

The following is a contribution to the synonymy of certain bodies of the chlorophyll group:

Chlorophyll (Pelletier and Handbooks) = crude chlorophyll (Wiesner).—Cyanophyll + Xanthophyll (G. Kraus).

Cyanophyll (G. Kraus) = chlorophyll (Wiesner).—Blue chlorophyll (Sorby).—Pure chlorophyll (Tschirch) + some *a*-Xanthophyll.

Chlorophyllan (Hoppe-Seyler) = Modified chlorophyll (Stokes).—Acid chlorophyll of the Handbooks.—Acidoxanthin (C. Kraus).—Filhol's precipitate (obtained on adding organic acids to chlorophyll tincture).—Crystallized chlorophyll (Gautier and Rogalski).—Pure chlorophyll (Jaudin).—Yellow chlorophyll (Sorby).—*a*-Hypochlorin (Pringsheim's hypochlorin).—(?) Borodin's chlorophyll crystals.—Coloring matter which produces the winter fading of certain evergreen plants (Haberlandt, G. Kraus, Askenasy).—Coloring matter which produces the discoloration of strongly acid leaves in the dark.

Phylloxanthin (Frémy?) (Tschirch) = xanthophyll (Berzelius) ex part. —? Chlorophyllie acid (Liebermann).—Xanthin (C. Kraus).

Phylloxanthin (Weiss) = alkali phyllocyanate (Tschirch).—Frémy's etiolin.

Phyllocyanic acid (Frémy, ex part) = pure chlorophyll (Berzelius, Mulder, Pfäundler, Harting).

Body precipitated by water from solution of phyllocyanin (Tschirch).—(?) Chlorophyllanic acid (Hoppe-Seyler).

Potassium chlorophyllinate (Tschirch) = Chlorinkali (C. Kraus).—Sachsse's precipitate formed by potassium or sodium in solution of cyanophyll.

*a*-Xanthophyll<sup>1</sup> = xanthophyll (G. Kraus).

<sup>1</sup>The xanthophylls here enumerated are perhaps identical; but till the point is definitely established, they may be conveniently distinguished by Greek letters.

$\beta$ -Xanthophyll = xanthophyll (Pringsheim). Yellow coloring matter of autumn leaves (perhaps identical with  $\alpha$ ).

$\gamma$ -Xanthophyll = yellow coloring matter soluble in ether; precipitated by potash from cyanophyll.—Xanthin (Dippel).—Xanthin (G. Kraus, ex part.

$\delta$ -Xanthophyll = Frémy's phylloxanthin, separated by barium hydroxide from cyanophyll.

$\epsilon$ -Xanthophyll = yellow coloring matter formed in Sachsse's reaction (treatment of cyanophyll solution with sodium); permanent in benzene solution (perhaps identical with  $\gamma$ ).

Xanthophyll (G. Kraus) = etiolin (G. Kraus).—Xanthophyll (Sorby) ex part.

Erythrophyll (Bougarel?) = chrysophyll (Hartsen).—Borodin's yellow crystals.— $\epsilon$ -Xanthophyll (Tschirch).

Anthoxanthin (Marquardt) = anthoxanthin (Pringsheim).—Xanthin and Xanthein (Frémy and Cloëz).

Yellow coloring matters of flowers.—*Jour. Chem. Soc.*, 1884, p. 57-62.

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## ON THE CONSTITUTION OF CHLOROPHYLL.

BY EDWARD SCHUNCK, F.R.S.

*A Paper read before the Royal Society, December 20, 1883.*

An examination of some products derived from chlorophyll, which has occupied me for some time, has led to the question of the true nature and constitution of chlorophyll, a question on which widely different opinions prevail. Without entering into matters which concern the physiologist only, it may be said that to the chemist chlorophyll is simply an organic coloring-matter, the substance to which the green color of leaves and other parts of plants is due. Now coloring-matters are of three kinds. To the first class belong such as occur ready formed and in a free state in vegetable and animal organisms, such as the coloring-matters of turmeric and safflower. The second class comprises those that are formed from colorless chromogens by the combined action of alkalis and oxygen, the coloring-matters of logwood and archil being well-known examples of this class. These coloring-matters change rapidly when exposed to the further action of oxygen in the presence of alkali, but are quite stable when in contact with acids. The third class consists of glucosides, bodies which do not undergo any considerable change under the influence of alkalis, but are rapidly decomposed when acted on by acids or ferments, yielding, on the one hand, some kind of glucose, and, on the other, sub-

stances in which the tinctorial properties of the parent substance are much more pronounced. To this division belong the coloring-matters of madder, quercitron, cochineal, etc. Now chlorophyll in its general properties so much resembles the members of the last class that one cannot help suspecting that to this class it may belong—that it is, in fact, a glucoside. It shows considerable stability in the presence of alkalis, but acids decompose it rapidly, giving rise to substances which are intensely colored and show a power of absorbing particular parts of the spectrum much more strongly than chlorophyll itself. Whether along with the latter bodies, it yields by decomposition with acids some kind of glucose seemed to me a question worthy of attention.

If it was possible to obtain chlorophyll in a state of purity it would be very easy to settle this question; unfortunately all attempts hitherto made to separate and purify chlorophyll have ended in its decomposition. I consider it as certain that the so-called crystallized chlorophyll which has been described by several authors is in fact a derivative of chlorophyll formed during the process employed for preparing it. It is, however, very easy to obtain a solution of chlorophyll which shall be quite free from everything soluble in water extracted at the same time from the plant, and therefore free from ready-formed glucose. In order to effect this I proceed as follows:—Having extracted leaves of any kind with boiling alcohol, I allow the extract to stand for some time, filter off the deposit which usually forms, and then mix it with its own volume of ether and with about two volumes of water, shaking up well. The liquid now separates into two layers, an upper green one, containing all the chlorophyll of the extract, and a lower bright yellow one, which contains tannin, a yellow coloring-matter, a substance giving the glucose reaction with Fehling's solution, and probably other substances besides. The two liquids are separated in the usual way, and the upper one is shaken up with fresh water, which now usually only shows a trace of color. This process of washing may be repeated, adding each time a little fresh ether, until the lower layer ceases to give the glucose reaction. The upper liquid leaves on spontaneous evaporation a bright green residue, which, though far from being pure chlorophyll, is free from everything soluble in water, and may therefore be employed to determine whether anything soluble in water, such as glucose, is formed by the action of acids on it. If some of the residue be treated with concentrated sulphuric acid in the cold it dissolves, forming a green solution, which, after standing for some time, gives, on the addition of water, a dark green precipitate. This precipitate

consists essentially of two substances, the phyllocyanin and phylloxanthin of Frémy, which are undoubtedly products derived from chlorophyll, showing the absorption-bands of what is usually called "acid chlorophyll." The liquid filtered from this precipitate, when mixed with copper sulphate and an excess of caustic alkali, becomes blue, and the mixture, on boiling, deposits cuprous oxide. The experiment may be made in a slightly different manner. The residue left by the green ethereal solution of chlorophyll having been dissolved in alcohol, sulphuric or hydrochloric acid is added to the solution, which is then boiled for some time, evaporated so far as to drive off most of the alcohol, filtered from the products insoluble in water, made alkaline, then mixed with Fehling's solution and boiled, when the usual glucose reaction takes place. In order to make sure that the reaction was not due to ready-formed glucose, I took in every case the precaution of testing a portion of the green chlorophylllic residue with Fehling's solution before acting on the rest with acid. This was easily done by treating with weak alcohol, to which a little alcoholic potash and some Fehling's solution were added, and heating, when the whole dissolved easily, giving a green solution, which, on boiling, in no case deposited the least trace of cuprous oxide, whereas, after adding an excess of hydrochloric acid to the liquid, boiling, filtering off the insoluble products, again making alkaline and boiling, the glucose reaction took place in a marked manner.

This experiment has never in any case failed, and it would follow, if uniformly successful, that the green leaves of all plants contain a glucoside insoluble in water, but soluble in alcohol and ether. That this glucoside is, in fact, chlorophyll seems to me highly probable. Nevertheless, absolute certainty cannot be attained, because the matter experimented on is a mixture, and it is possible that one plant out of many might give a decidedly negative result, which would upset the conclusion drawn from the rest. Assuming, however, that the phenomena will always occur as above described, and that the reaction with Fehling's solution indicates the presence of some kind of glucose, it would follow either that chlorophyll is a glucoside or that it is always accompanied in the vegetable cell by a glucoside of very similar properties. I may add that I attempted to isolate the glucose or glucose-like substance formed under the circumstances described, spinach leaves being the material employed, and obtained a pale yellow gum-like substance which showed no tendency to assume a crystalline form.—*Chem. News*, Jan. 4, 1884, p. 2.



## MICROSCOPICAL CHARACTERISTICS OF VEGETABLE FIBRES.

In a paper on this subject in the "Zeitschrift für Warenkunde," Dr. V. Berthold classifies the more important vegetable fibres, according to the action upon them of iodine and sulphuric acid, as follows :

A. Colored blue, violet, or green by iodine and sulphuric acid: Flax, Chinese grass and ramie (*Boehmeria nivea*), roa (*Pipturus argenteus*), cotton, hemp and sunn-hemp (*Crotalaria juncea*).

I. Transverse sections colored blue or violet, but showing no yellow middle lamella; cell-cavity usually filled with a yellow mass.

a. *Flax*.—Transverse sections occur either isolated or a small number grouped together; the separate transverse sections are not contiguous; they are polygonal, bounded by straight lines, and have sharp edges. Lamination evident, blue or yellow cell-cavity, yellow dot. Longitudinal distortions of the striae are indicated by darker lines, which usually cross.

b. *Chinese Grass and Ramie*.—Transverse sections isolated or a small number in a group; their connection very loose; they are polygonal or irregular, and very large. Lamination very evident; cell-cavity large and irregular, often filled with dark yellow masses; sometimes striated radially. The breadth of the fibres is very variable, in the longitudinal aspect some appear very broad; distortions evident; the ends thickly rounded.

c. *Roa-fibre*.—Transverse sections not many in a group, polyhedral, usually with straight or slightly curved sides and rounded edge; cell-cavity narrowly oblong, regular; contents sometimes yellow. Some transverse sections are surrounded by a thin greenish lamella, and show well-marked radial striae or fissures, and concentric lamination; the separate lamellæ vary in depth of color.

d. *Cotton*.—Transverse sections always isolated, rounded, of various forms, usually kidney-shaped; cell-cavity narrow, linear; contents usually yellow. No lamination.

II. Transverse sections blue or violet, polyhedral, rounded or irregular, always surrounded by a yellow middle lamella.

a. *Hemp*.—Transverse sections always in groups, contiguous, with rounded edge, surrounded by a thin yellow middle lamella, beautifully laminated concentrically; cell-cavity linear, simple or branched, irregular, sometimes broad, without contents.

b. *Sunn-hemp*.—Transverse sections numerous in a group, closely contiguous, resembling those of hemp, often sickle-shaped, either polyhedral or oval, with a small round cell-cavity; often with yellow contents. Surrounded by a broad yellow middle lamella, from which the inner laminae are often detached.

B. Colored yellow by iodine and sulphuric acid.

I. Dicotyledons. No vessels besides the bast fibres; cell-cavity with constrictions.

1. Transverse sections in groups, polygonal, bounded\* by straight lines, with sharp edges; cell-cavity round or oval, smooth, empty; surrounded by a narrow middle lamella of the same color.

*a. Jute*.—Cell-cavity large, roundish, oval; middle lamella very narrow; no lamination; the ends always rounded, and almost always strongly thickened.

*b. Abetmoschus*.—Transverse sections larger than in *a*, bounded by straight lines, sharp-edged; cell-cavity a dot or line, oval, rarely angular, smaller than in *a*. Fibres of uniform thickness, ends broad, rounded, often thickened; cell-cavity variable, often reduced to a line.

2. Transverse sections always in groups, polygonal, bounded by straight lines, with sharp or slightly rounded edges; cell-cavity empty. Middle lamella broad and decidedly darker than the transverse section; cell-cavity with constrictions, locally entirely absent.

*a. Hibiscus*.—Edges sharp or rounded; in the first case the cell-cavity small, in the latter case broader and oval; middle lamella sometimes wanting; transverse sections only slightly and inconspicuously laminated. Fibres of very various thickness, not usually striated longitudinally; ends blunt and almost always thickened.

*b. Urena sinuata*.—Edges sharp; cell-cavity very small, a dot or narrow short line; middle lamella broad and very distinct; transverse section not laminated. Fibres of uniform thickness, rarely striated longitudinally; ends rounded, rarely somewhat thickened.

II. Monocotyledons. Vessels in addition to bast-fibres; cell-cavity without constrictions.

1. Transverse section usually rounded, rarely polyhedral; cell cavity always round; no middle lamella.

*a. New Zealand Flax (Phormium tenax)*.—Transverse sections small, usually round, closely contiguous, polygonal, with rounded edges; cell-cavity empty. Fibres thin, uniform, smooth, rigid; cell-cavity small, of uniform breadth, without striation or distortion; ends sharp.

*c. Manila Hemp (Musa textilis)*.—Transverse sections polygonal, with rounded edges or roundish; cell-cavity large, roundish, sometimes with yellow contents. Fibres of uniform thickness, smooth, not striated, with thin walls; ends sharp or slightly rounded. After combustion of the fibre siliceous skeletons remain behind in the form of strings.

2. Transverse section evidently polygonal; cell-cavity polygonal, with one or more sharp edges, moderately large; no middle lamella.

*a. African Hemp (Senseviera)*.—Transverse sections closely contiguous, not laminated. Fibres thin, smooth, with sharp ends.

*b. Aloe*.—Transverse sections not very numerous in a group; edges slightly rounded; cell-cavity not very large, polygonal, often with rounded ends; large spiral vessels. Fibres of uniform thickness, without structure; ends sharp or rounded.

*c. Agave*.—Transverse sections polygonal, bounded by straight lines, closely contiguous; cell-cavity large, polygonal; its edges less sharp. Fibres rigid, considerably broader towards the middle; ends broad, thickened, sometimes split.

3. *Yucca*.—Transverse sections polygonal, closely contiguous, small, bounded by straight lines; edges very sharp; cell-cavity small, round or linear; middle lamella very evident. Fibres narrow, striated, with sharp ends.—*Phar. Jour. and Trans.*, Jan. 26, 1884, p. 587.

## MANUFACTURE OF CELLULOSE.

The use of sulphurous anhydride in the manufacture of cellulose is becoming of more importance every day. In 1876 Mitscherlich recommended treating finely divided wood under pressure with a solution of calcium bisulphite obtained by placing calcium carbonate in a tower and introducing water into the top and sulphurous anhydride into the bottom. Paper made from the resulting cellulose was found to be exceedingly tough, and has been sold as a second quality parchment paper, although it does not possess the qualities which characterize this paper. The details of Mitscherlich's process have since been kept secret. Francke works with solutions of calcium, magnesium, or sodium sulphite of 4° to 5° B., at a pressure of 4 to 5 atmospheres, the operation being completed in 12 to 15 hours. He uses rotary horizontal cylindrical boilers lined with lead, the lining being independent of the outer casing, thus forming a separate boiler. The essential theoretical difference between the lime and the magnesia process is that the resulting calcium sulphate, being almost insoluble, remains in the lignose, whilst the magnesium sulphate is removed during the washing operation. At present it is uncertain whether other differences exist between the two processes.

The cost of pulp by Eckmann's method, depending on the use of magnesium sulphite, is 26 marks per 100 kilos., the selling price being about 40 marks. During last summer this method was tested by a number of French paper manufacturers with the following results: The quantity of wood employed was 4,395 kilos., in the form of fir planks. The loss by removal of knots in chopping, grinding, etc., amounted to 825 kilos. The remaining 3,570 kilos. yielded 1,437 kilos. dry cellulose, corresponding with 32.68 per cent. of the original wood. The latter contained 21 per cent. of moisture, so that the yield on the dry substance is equal to 40 per cent. This is considerably less than the yield obtained by the Francke-Mitscherlich process; the quality of the pulp, however, is far superior. According to recent trials made by Eckmann, it is shown that it is possible to obtain at will either isolated cells or fibrous bundles by using either hydrogen magnesium sulphite or magnesium sulphite. In the former case, the coloring and glutinous substances are completely dissolved, whilst in the latter case a portion of the gluten remains in the fibres.

Archbold macerates the woody tissue with dilute milk of lime, saturates with sulphurous anhydride at a pressure of 4 to 5 atmospheres, and washes the mass with water.

Tilghman's method consists in boiling in closed vessels wood, esparto or flax, with sulphurous anhydride or calcium bisulphite, or both.

Pictet recommends the use of liquid sulphurous anhydride. Finely divided wood is first immersed in water, and for every litre 120 grams of liquid sulphurous anhydride is added. At a temperature of 85° a pressure of 7 atmospheres is produced, so that the incrustating substances of the wood are strongly attacked. The pulp has the grey color of the original wood, but may be easily bleached.

In discussing the sulphite treatment, Bourdilliat contradicts the state-



ment that sulphuric acid is formed when wood is boiled with sulphites; moreover, he believes that the sulphurous anhydride dissolves the incrustating substances of the wood, bleaches the coloring matters, and deposits finely divided sulphur in the fibres, whilst the resins, which are attacked by sulphurous anhydride, form soaps with the base of the bisulphite. These, together with the sulphur, remain in the fibre and add considerably to its weight; the loss during the washing operations is therefore not of fibre but of the mass-compound of sulphur, resin and lime.

Cross is under the impression that the action of the magnesium sulphite is to prevent the oxidation of wood and lignified cellulose when heated with water under pressure. For comparing the success of the different sulphite processes, the test for lignose with aniline sulphate is said to give unsatisfactory results: it is preferable to treat the cellulose first with chlorine and then with sodium sulphite; if lignose is present, a magenta color is produced.—*Jour. Chem. Soc.*, Feb., 1884; *Dingl. Polyt. Jour.*, vol. 249.

## PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

PHILADELPHIA COLLEGE OF PHARMACY.—At the close of the *Junior* course an examination was held on Thursday, February 14. The practical examination took place in the forenoon; the written examination, which was held in the afternoon and evening, was on the following questions:

### BOTANY AND MATERIA MEDICA.

1. *Leaves.* Describe briefly their anatomical structure (Epidermis, Stomata, Parenchyma, Palisade Layer and Veins).
2. Explain by description or diagram the general character of *Indefinite* or *Centripetal*, and of *Definite* or *Centrifugal Inflorescence*. Show how both forms are combined in the inflorescence of mint.
3. *Seeds.* Give two examples each of seeds with and without albumen. What is the origin of the tissue called albumen (Endosperm and Perisperm)?
4. *Peppermint.* Give the botanical name and habitat of the plant. Describe it (stem, branches, leaves, inflorescence, calyx, corolla, stamens, ovary). How much Volatile Oil does it yield? What is the name of its Stearopten?
5. *Coniferae.* In what respect does the structure of the wood differ from that of dicotyledons? Name several officinal drugs derived from this natural order.

### CHEMISTRY.

1. What is a Thermometer? What two Thermometer Scales are now used in the United States Pharmacopœia? What are the fixed points on each of these, and how is the intervening space divided? How can you convert readings of one of these into the corresponding readings of the other? What are the limits of heat and cold capable of being recorded by the Mercury Thermometer?
2. In what several ways can electricity be developed? Is there any difference in the character of the Electricity developed by the frictional machine and that developed by the galvanic battery. Which would be used for nickel or silver plating, and which has the stronger physiological effect?
3. How is Chlorine made? State the materials used and write the chemical reaction. How do you explain its bleaching action? What compounds



does it form with the metals? Give the chemical formulas of one or more such compounds.

4. What is the difference between a *Sulphide*, a *Sulphite* and a *Sulphate*. Give the chemical formula of one compound of each of these classes. What are the tests by which we distinguish each of these classes.

5. Write the reaction for the manufacture of Nitric Acid, *a*, as carried out commercially, and *b*, as made on a smaller scale. Give the formulas of three Nitrates.

#### PHARMACY—THEORETICAL AND PRACTICAL

1. What is the specific gravity of five grammes of Hydrochloric Acid? What is the specific gravity of a pint of the same liquid? What is the weight of a litre of Nitric Acid?

2. Explain the effect of heat upon the principles obtained from organic substances by solution as in tinctures, infusions, decoctions, etc. What relation does the strength of an extract bear to the drug from which it is made? Explain the difference between an inspissated juice and an alcoholic extract.

3. Why was "Vinum Album Fortior" introduced into the United States Pharmacopœia? And how is it made?

4. How many systems are recognized in Crystallography? How may the proper degree of concentration of liquids intended for crystallization be judged? What is Isomorphism?

5. How is Spirit of Ammonia U. S. P. 1880 made? How is its strength indicated in the official definition?

#### COMMITTEE.

1. Briefly describe and illustrate by diagram the structure of a woody Dicotyledonous stem.

2. What are Molecules? How do Molecules differ from Atoms? What difference exists between the Molecular condition of Liquids and Gases? What effect has heat upon the Molecules of matter.

3. Describe a Barometer, and state its principle of action. How do the influences which cause variations in a barometer affect the ordinary boiling point of a liquid?

4. In what form is Phosphorus usually found in commerce? What precaution is necessary for its preservation? Describe briefly its mode of manufacture. Give the names and chemical formulæ of the several varieties of Phosphoric Acid.

5. Explain the uses of plain and plaited Filters respectively. Describe a method of hastening the process of filtration. What is the best angle for the sides of a funnel to make with each other for ordinary pharmaceutical uses?

#### PRACTICAL EXAMINATION.

1. Percolate 4 oz. av. of Ground Wild Cherry Bark with one pint of water.

2. Dissolve one ounce of commercial chloride of ammonium in water, purify it, retain one-half of the solution, pouring it into the small bottle; leave the funnel containing the filter, in the bottle for examination.

3. Granulate the remainder of the solution and put the product in a paste-board box.

The specimens for examination and recognition were as follows:

Marrubium,	Tinct. zingiberis,	Aqua chlori,
Chondrus,	Syrupus toluanus,	Potassii chloras,
Matricaria,	Ferri sulphas præcip,	Magnesii sulphas,
	Unguentum zinci. oxidi.	

The re-examination of those students who failed in one or more branches

will be held on Monday afternoon, September 29, at 3 o'clock, when others also will be examined under the rules of the College prior to entering the senior class.

The Senior examination took place from Tuesday, February 26, and closed on the following Saturday with the examinations in practical pharmacy and in chemical analysis. The questions were as follows:

## MATERIA MEDICA.

*A. Canadian Hemp.* Give the botanical name, natural order, habitat and official part of the plant. Describe the physical and structural characters of the drug, and state how it differs from the corresponding part of an allied indigenous plant. Give the medical properties and dose of the drug.

*B. Bloodroot.* Which part is official? Give the botanical name, natural order and habitat of the plant. Describe the physical and structural characters of the drug, and give its medical properties and dose. Give the important characters of one of its alkaloids, and name another official plant containing the same alkaloid.

*C. Logwood.* Give the botanical name, natural order and habitat of the tree. Describe the drug and state how it differs from other woods having a similar color. Name and characterize its important constituents. Give its medical properties and dose.

*D. Willow-bark.* Give the botanical name, natural order and habitat of the tree. Describe the physical and structural characters of the drug, and state its difference from the bark of old wood. Give the outlines of a process for preparing its bitter principle; also, the chemical characteristics of the latter.

*E. Senna leaves.* From which genus and which natural order are they obtained? How does the tribe "Senna" differ from other tribes of the same genus? Name the commercial varieties, and give of each the botanical name and habitat of the plant, the principal characters of the drug and its admixtures. To which principle are the laxative properties of Senna mainly due, and what is its behavior to solvents?

*F. Colocynth.* Give the botanical name, natural order and habitat of the plant. Describe the drug, state the cause of the plump or shrivelled appearance of the commercial varieties and explain the growth of the placente. What is the percentage of seeds and pulp? Give the medical properties, dose and effects of overdoses of the drug. Name the bitter principle, and state its behavior to hot diluted acids.

*G. Ergot.* Give the botanical name, and, as briefly as possible, the complete history of development of the fungus. What alkaloids have been obtained from Ergot? To which principles are the effects of Ergot believed to be due? Give an outline of the process for preparing these principles.

*H.* Give the botanical names and habitat of the plants of the natural order of Loganiaceae yielding official seeds. Describe, briefly, the physical and structural characters of the seeds. Give the names, the percentage and the characteristic reactions of the two alkaloids found in these seeds.

*I. Benzoin.* Give the botanical name, natural order and habitat of the plant, and state how the drug is obtained. Describe the drug and point out the principal differences between Sumatra and Siam Benzoin. Name the constituents, give the percentage of the peculiar acid, and state how the presence of another acid sometimes present may be detected.

*K. Cacao Butter.* Give the botanical name, natural order and habitat of the plant; also the part of the plant yielding the oil and the percentage obtained. Give the physical properties and constituents of the drug and describe a test for the detection of adulteration.

## THEORY AND PRACTICE OF PHARMACY.

A. Identify the following liquids by a calculation, and show how you obtained the results. 1. A pint of an official liquid weighs 6,562 grains, what is its specific gravity, and give the official name of the liquid? 2. Each fluidounce of two official liquids weighs 528.6 grains, give the specific gravity and official name of each. 3. A litre flask holds 1,250 grams of an official liquid, what is its specific gravity and official name?

B. Give the unabbreviated official names, ingredients, outlines of process, and describe the appearance of the following preparations of the U. S. P., 1880: Purified Animal Charcoal, Mustard Paper, Belladonna Plaster, Extract of Krameria, Saccharated Iodide of Iron, Solution of Arsenious Acid, Phosphorated Oil, Compound Syrup of Sarsaparilla.

C. What changes are apt to take place in the following preparations when exposed to either air, light or summer heat? Give the best method of protecting each: Succus Rubi Idae, Potassii Carbonas, Tinctura Kino, Syrupus Ferri Iodidi, Pulvis Rhei Compositus, Magnesia Ponderosa, Pulvis Scillae, Extractum Gossypii Radicis Fluidum.

D. State whether the following preparations are kept better in sealed packages or partially exposed to the air? Give reasons for your judgment, and name the best container for the dispensing counter for each preparation: Ergot, Rhubarb Pills, U. S. P., Taraxacum Root, Powdered Cloves, Acetate of Lead, Diachylon Ointment, Iodide of Calcium, Powdered Extract of Glycyrrhiza, Chlorinated Lime, Hydrocyanic Acid.

E. Give the English names, and ingredients used in the preparation of Abstractum Jalapae, Bismuthi et Ammonii Citras, Ceratum Cantharidis, Confectio Rosae, Decoctum Sarsaparillae Compositum, Emplastrum Ammoniaci cum Hydrargyro, Extractum Belladonnae Alcoholicum, Linimentum Terebinthinae, Liquor Guttae Perchae, Mistura Rhei et Sodae.

F. Calculate the quantities in grains and fluidounces that would be required of each ingredient to make five pints of Tincture of Opium from the official formula. Put all of the figures on your examination paper that you used in obtaining the answer.

G. Give the test for recognizing the Aloins, Morphine, Quinine, Strychnine and Veratrine.

H. Describe, briefly, the usually accepted theory of the action of Pepsin, Extract of Malt, and Pancreatin on food. Give the sources and usual method of preparation of Pepsin and Extract of Malt.

I. Define incompatibility, as applied to prescriptions; is it ever intentional? State under what circumstances filtration may be used in compounding prescriptions. When is the pharmacist justified in making an addition to a prescription? Illustrate, by practical example, each of the above points.

K. What three physical qualities must a good pill mass possess? Why is each quality necessary? Define the term excipient. Name four excipients used in official pills containing aloes. Write out a prescription using proper abbreviations, ingredients and excipient for 24 pills each containing  $\frac{1}{2}$  grain of Permanganate of Potassium. Write out three forms of metric prescription for a four-fluidounce solution containing in each teaspoonful  $\frac{1}{16}$  of a grain of Sulphate of Strychnine, one grain of Sulphate of Quinine, two grains of Citrate of Iron and Ammonium, and equal parts of Syrup and water.

## CHEMISTRY.

A. What two methods can you give for the manufacture of Potassium Bromide? Explain the several chemical reactions that occur in each of these methods. What are the impurities to be looked for in Commercial Bromide of Potassium? By what tests are these impurities shown?

B. Give the chemical formulas for Magnesii Sulphas and Zinci Sulphas respectively. State the physical differences between the two compounds by which they may be distinguished. State by what qualitative analytical tests you could distinguish between them with absolute certainty.



C. What is the chemical composition of Hydrargyri Oxidum Rubrum, of Hydrargyri Oxidum Flavum? What are the physical properties of the two preparations? What is the chemical difference between Hydrargyrum Chloridum Mite and Hydrargyrum Chloridum Corrosivum? What is the chemical composition of Hydrargyrum Ammoniatum? How is it made?

D. What is "White lead"? Describe its manufacture. What is its official name, and what are the physical and chemical properties ascribed to it by the Pharmacopœia? What are its pharmaceutical and technical uses?

E. Give the chemical formula of Alumen, of Alumen Exsiccatum. State how the first is changed into the second, noting the limitations of temperature. Give the chemical formula of Aluminii Hydras, and state the official process for preparing it.

F. What is Ferrum Reductum? How is it made? Write the chemical reaction for this process. Give the chemical formulas of Ferri Oxidum Hydratum, of Ferri Chloridum, Ferri et Ammonii Sulphas, Ferri Oxalas.

G. What is the chemical composition of Petrolatum? How does it differ, chemically, from Benzinum? Describe the appearance and properties of the two substances. What are the pharmaceutical uses of each of these?

H. What is the chemical composition of both vegetable and animal fats? By what several processes can fats be decomposed? Write two reactions illustrating these different methods of decomposition. State what the products are in the respective cases. Is there any official process that involves the decomposition of a fat in any such way?

I. What is the difference between a Phenol and an Aromatic Acid? To which class does Acidum Carbolicum belong? Acidum Benzoicum? Acidum Salicylicum? Give the reaction for the artificial formation of this latter compound.

K. What is a Glucoside? What is an Alkaloid? What chemical reactions will serve as a means of deciding between the two classes? How are Glucosides decomposed, and what are the products of their decomposition?

#### COMMITTEE.

A. State the official title of Solution Subacetate of Lead. Write out the official process, and give the specific gravity of the solution. What precaution is necessary for its preservation, and why? Name two official preparations into which it enters, and give the formula for the preparation of each. Give the official definition, and a test of its purity.

B. Give the botanical name, habitat, official portion, important constituents and medicinal properties of one plant of each of the following natural orders: Ranunculaceæ, Rubiaceæ, Compositæ, Melanthaceæ, Umbellifereæ.

C. What is the official name of Phosphorated Oil? What percentage of Phosphorus does the oil contain? What fixed oil is used in its preparation? Give an outline of the process directed for making it. What is the object of adding the ether? What is the dose of Phosphorated Oil? What directions are given in reference to its preservation? What chemical change is likely to occur if these directions are neglected?

D. Name the principal constituents of Milk. State how they may be separated from each other. Name an official *Solid* obtained from Milk, and state its principal use in pharmacy. What official *Liquid* is derived from milk? What official *Salt* does this liquid enter into?

E. Give the natural order and habitat of *Atropa Belladonna*. Briefly describe the physical properties and the structural characteristics of the official portions of the plant. Give the official name and chemical formula of the chief active constituent of *Belladonna*. What is the largest *safe* dose of this constituent? Name three other plants of the same natural order containing nearly or quite identical principles. When the active



constituent of Belladonna is treated with dilute Hydrochloric Acid, what are the products of its decomposition? Give the officinal name, part used and ordinary dose of three *galenical* preparations of Belladonna. To what other important drug is Belladonna therapeutically antagonistic?

F. Give the officinal title and definition of the following drugs; also, state the botanical name, natural order and habitat of the plants which furnish them: Camphor, Star-anise, Scammony, Coca, Asafetida, Guarana, Mastie, Staves-acre, Jaborandi, Nutgall.

G. At what temperature does water attain its greatest density? What is the officinal unit for comparison of the densities of solid and liquid bodies? What is the weight in grams of a decilitre of officinal Nitric Acid? What is the weight in grams of a litre of officinal Ether? What is that officinal liquid, half a litre of which weighs 1,050 grams?

H. Give the officinal name, specific gravity and symbol of Mercury. Name some of the localities from which it is obtained, and state in what combination it usually exists in nature. What process is generally employed in separating it from this combination? Give both the boiling point and congealing point of Mercury, F. What two series of salts are formed by Mercury? To which series does Corrosive Sublimate belong? State its dose and chemical formula, and give a test for it in solution. To which series does Calomel belong? Give its chemical formula. Name three officinal preparations into which Mercury enters in the metallic state.

I. State the commercial methods used in the preparation of Starch. Into what is it converted when boiled with dilute acids? Give the chemical formula of Starch and its test. What is the chemical formula of Glucose? Give a test for it. How does it differ, chemically, from Cane Sugar? Describe the chemical reaction that takes place when Glucose is subjected to fermentation. Give the officinal name of the principal product formed.

## K.

1.

Would you dispense this prescription? Give your reason why.

R Atropine Sulphatis..... gr. ii  
Aque Destillate..... f ̄ssii  
Fiat solutio.

Signa. Take a teaspoonful every four hours.

2.

Would you dispense this prescription? Give your reason why.

For Mr. Hayes' infant.

R Bismuthi Subnitratiss..... ̄i  
Misture Crete ..... f ̄ss  
Tincture Opii..... f ̄ss

Misce, signa. Give a teaspoonful every four hours.

3.

Would you dispense this prescription? Give your reason why.

R Arsenii Iodidi..... gr. iv  
Hydrarg. Iodidi Viridis gr. viii  
Ferri Iodidi..... gr. xxxii

Misce, fiant Pilule No., xxxii

Signa. Take one pill three times a day.

4.

How would you prepare this prescription? State the chemical action occurring, and give the reason for each step in the process.

R Acidi Hydrochlorici..... gtt. xv  
Potassii Chloratis..... ̄ss  
Aque Cinnamomi..... f ̄ssiv

Signa. Take a teaspoonful every hour.

5.

Write out a direction for preparing this prescription, and give your reason for so doing.

R Morphine Sulphatis..... gr. ii  
Tincture Tolutane..... f ̄ss  
Aque..... f ̄ssiii

Misce et signa. For cough. Take a teaspoonful every four hours.

6.

Write out a direction for preparing this prescription, and give your reason for so doing.

R Olei Sabine..... m. xx  
Pulveris Aloes..... gr. v  
Misce, fiant Pilule No., xx

Signa. Take one pill three times a day.

The following specimens were examined by the candidates :

MATERIA MEDICA.	PHARMACY.	CHEMISTRY.	COMMITTEE.
<p> <i>Bryonia</i>,  <i>Arn. cæ radix</i>,  <i>Cinchona rubra</i>,  <i>Xanthoxylum</i>,  <i>Buchu (long)</i>,  <i>Pilocarpus</i>,  <i>Juniperus</i>,  <i>Coriandrum</i>,  <i>Linum</i>,  <i>Aloe</i>.                 </p>	<p> <i>Ferri sulphas exsicc.</i>,  <i>Amylum iodatum</i>,  <i>Pulv. Glycyrrhizæ comp.</i>,  <i>Petrolatum</i>,  <i>Extractum Gentianæ</i>,  <i>Aqua Camphoræ</i>,  <i>Liquor Sodæ chloratæ</i>,  <i>Tinct. Lavandulæ comp.</i>,  <i>Syrupus Hypophosphitum</i>,  <i>Extract. Spigeliæ fluidum</i> </p>	<p> <i>Potassii bitartras</i>,  <i>Sodii bicarbonas</i>,  <i>Ammonii chloridum</i>,  <i>Magnesi sulphas</i>,  <i>Zinci sulphas</i>,  <i>Plumbi æras</i>,  <i>Acidum aceticum</i>,  <i>Acidum gallicum</i>,  <i>Anylum</i>,  <i>Alcohol</i>.                 </p>	<p> <i>Aqua Menthæ piperitæ</i>,  <i>Acetum Scillæ</i>,  <i>Syrupus Pruni Virgin.</i>,  <i>Podophyllum</i>,  <i>Scilla</i>,  <i>Buchu (short)</i>,  <i>Anisum</i>,  <i>Potassii nitras</i>,  <i>Sodii boras</i>,  <i>Zinci sulphas</i>.                 </p>

In the examination on Operative Pharmacy the candidates were required to prepare—

1. Suppositories composed of butter of cacao, and containing extract of stramonium and tannin :

2. Lozenges, containing extract of glycyrrhiza, gum arabic, sugar, oil of sassafras, oleoresin of cubeb and syrup of tolu ;

3. Emulsion, 4 fluidounces, containing 1 fluidounce of oil of turpentine ;

4. Compound pills of iron, and

5. To spread a soap plaster 6 x 4 inches.

The examination in Analytical Chemistry was for the first time required and showed in its results that most of the students were practically familiar with the principles of analytical chemistry. Each candidate was furnished with a solution containing three or four salts, and was required to search for both bases and acids within two hours. The following is one of a number that were given : Aluminium sulphate, Potassium acetate, Ferric chloride, Cupric nitrate.

The following 150 students passed the examination, and were recommended to the Board of Trustees for the degree of Graduate in Pharmacy (Ph. G.):

Frederick William Alexander, New York, *Linimentum Animonie*.  
 Charles Spencer Allen, New Jersey, *Pharmacy Laws and Ethics*.  
 Harry Warren Anderson, Maine, *Medicine Chest*.  
 Grace Lee Babb, Maine, *Microscopy of Malt*.  
 Thomas David Baker, Pennsylvania, *Piscidia Erythrina*.  
 Harry Lee Barber, Pennsylvania, *Menispermum Canadense*.  
 Abraham Lincoln Ballinger, New Jersey, *Impurities in Myrrh*.  
 William Hart Betts, Pennsylvania, *Caffea*.  
 Edwin K. Beans, Jr., Pennsylvania, *Tobacco*.  
 Charles Wesley Bollinger, Pennsylvania, *Preparation of Medicines*.  
 Jacob Curtis Bollman, Pennsylvania, *Clerk and Student*.  
 Edgar Ellsworth Booze, New Jersey, *Lead and Lead Salts*.  
 William Carlton Boynton, Maine, *Spigelia*.  
 Walter S. Bray, Maine, *Tests for Albumen*.  
 Frank Frederick Bridgeman, Wisconsin, *Sodii Bromidum*.  
 Matt. Ashley Briggs, Georgia, *Eriodictyon Californicum*.  
 Buchanan Carter, North Carolina, *Sodii Chloridum*.  
 William E. Cassell, Pennsylvania, *Conwallaria Majalis*.  
 Isaac Eugene Chandler, Pennsylvania, *Opium*.  
 Abraham Theophilus Clayton, Pennsylvania, *Castanea*.  
 William Lincoln Cliffe, Pennsylvania, *Iris Versicolor*.  
 La Rue Robert Colegrove, New York, *Adulterations*.  
 John Joseph Coleman, West Virginia, *Cephaelis Ipecacuanha*.  
 L. D. Paul Collins, Ohio, *Rhus*.

- Harry C. Cook, Ohio, *Erythroxylon*  
 William Alexander Cook, Georgia, *Potass. Chlorate and Syr. Ferri Iodidi*.  
 Joseph Crawford, Pennsylvania, *Martynia Proboseidea*.  
 Samuel Douglas Crawford, Pennsylvania, *Ergota*.  
 Charles Thomas William Cress, Pennsylvania, *Disinfectants*.  
 John Whiteside Custer, Pennsylvania, *Pills*.  
 Frederick Augustus Dalpe, Pennsylvania, *Bayewra*  
 Francis Leanning Darrach, Pennsylvania, *Phytolacca Berca*.  
 John Jenkins Davies, Pennsylvania, *Boric Acid*.  
 Bernard H. De Huy, Kansas, *Aqua Marina*.  
 William Dutton, New Jersey, *Pharmacy*.  
 Eugene Gustav Eberle, Wisconsin, *Cascara Sagrada*.  
 Charles Matthew Edwards, Maryland, *Sanguinaria*.  
 Edmund Hann Evans, Pennsylvania, *Crystallization*.  
 Milton Smoker Falek, Pennsylvania, *Cimicifuga*.  
 John Charles Falk, Missouri, *Assay of Citrate of Iron and Quinine*.  
 Charles Louis Feldkamp, Illinois, *Pharmacoporia Extracts*.  
 William Anderson Fettes, Pennsylvania, *Potassium*.  
 Frank Penicks Fettes, Pennsylvania, *Opium*.  
 Eugene Anderman Fillman, Pennsylvania, *Stramonium*.  
 Robert Fechtig Finck, Pennsylvania, *To know all this is wholesome*.  
 George Thomas Fitzgeorge, New Jersey, *Glycerin*.  
 Philip Thomas Fitzpatrick, Pennsylvania, *Cambogia*.  
 Daniel Follmer, Pennsylvania, *Honey*.  
 Frederick Henry Fox, New York, *Syracuse Salt Water*.  
 William Hubbell Gano, Jr., Delaware, *Scaled Salts of Iron*.  
 Charles Gardner, Iowa, *Zea Mays*  
 John Goldbach, Ohio, *Decoctions and Infusions*.  
 Frank Barr Groff, Pennsylvania, *Pills of Permanganate of Potash*.  
 Humes Hall, Pennsylvania, *Pepsin*.  
 Robert Newton Harper, Virginia, *Extractive Matters of Drugs*.  
 William Henry Harrison Headley, Pennsylvania, *Salicylic Acid*.  
 Eugene Samuel Heiberger, Pennsylvania, *Creosote*.  
 Robert Lewis Hesson, Pennsylvania, *Caffeina*.  
 John Michael Hillan, Pennsylvania, *Maydis Stigmata*.  
 Levi Ellsworth Hinckley, Ohio, *Our Pharmacists*.  
 Levi Brook Hirst, New Jersey, *Coating of Pills*.  
 Ephraim Zeigler Hoffman, Pennsylvania, *Convallaria Majalis*.  
 Calvin Jerome Houck, Pennsylvania, *Sanicula Marilandica*.  
 Oscar Honck, Wisconsin, *Sorghum Sugar*.  
 John Thompson Huff, Virginia, *Oleum Morrhua*.  
 George Herman Ischler, Pennsylvania, *Cosmoline*.  
 Elmer Ellsworth Johnson, Pennsylvania, *Zinc*.  
 Thomas Crawford Johnston, Pennsylvania, *Crystallization*.  
 James Frederick Judd, England, *Rhamnus Purshiana*.  
 Frederick Rudolph Keller, Pennsylvania, *Syrupus*.  
 George Dering Keller, Pennsylvania, *Education for Pharmacists*.  
 John William Keller, Pennsylvania, *Emulsions*.  
 William Clarence Kelly, Pennsylvania, *Acetic Acid*.  
 William Henri King, Pennsylvania, *Opium*.  
 Albert Henry Kinsey, Ohio, *Dispensing by Drops*.  
 George Lewis Klump, Pennsylvania, *Abuses in Pharmacy*.  
 William Matthew Koenig, Pennsylvania, *Prunus Virginiana*.  
 Charles Franklin Krum, Pennsylvania, *Phosphorus*.  
 Louis Carl Kusenberg, Pennsylvania, *Hydrogen Sulphide*.  
 John Douty Kutzner, Pennsylvania, *Chemical Affinity*.  
 William Harrison Laubach, Jr., Pennsylvania, *Biborate of Lithium*.  
 Charles Elsner Lawall, Pennsylvania, *Glyceritum Amyli*.  
 Harry Bellerjeau Leeds, New Jersey, *Rhus Aromatica*.  
 Robert Leithend, Jr., Delaware, *Pilocarpus Pinnatifolius*.  
 Isaac Edward Leonard, Pennsylvania, *Oleum Gaultherie*.

- Clement Belton Lowe, Pennsylvania, *Silico-Fluorides*.  
John Sloan McCaully, Pennsylvania, *Jamaica Dogwood*.  
James Ralston McCausland, Pennsylvania, *Value of Pharmaceutical Associations*.  
Wm. John McCoun, Pennsylvania, *Precipitate from Tinct. Sanguinaris*.  
Franklin McCoy, Ohio, *Maydis Stigmata*.  
Tracy McKenzie, Texas, *Cinchona Bark*.  
John Clarence McVicker, West Virginia, *Mineral Waters*.  
George Frederick Maddock, New Jersey, *Salts of Lithium*.  
Henry Wilbur Maitland, Pennsylvania, *Success in Pharmacy*.  
Emlen Martin, New Jersey, *Cantharis*.  
John Edwin Martin, Pennsylvania, *Emulsions*.  
Harry Lovett Miller, Jr., Illinois, *Analysis of Phosphoric Acid*.  
Andrew Herman Joseph Maguire, England, *Tincture of Nux Vomica*.  
Frank Xavier Moerk, Delaware, *Malt*.  
Christian Moore, Pennsylvania, *Bismuth*.  
John August Morris, Pennsylvania, *Syrups*.  
Louis Murjahn, Pennsylvania, *Teucrium Scordium*.  
James White Murrow, Pennsylvania, *Cascara Sagrada*.  
John Anthony Murtagh, Pennsylvania, *Chalybeate Pills*.  
Thomas Oliver Nock, Delaware, *Abstracts*.  
Chas. Herman Oberholtzer, Pennsylvania, *Maydis Stigmata*.  
William Ogilby, Pennsylvania, *Mineral Acids*.  
Frank Boyd Olmstead, New York, *Potassii Iodidum*.  
Melmoth Mereer Osborne, Pennsylvania, *Boroglyceride*.  
Gomer David Owen, Ohio, *Bromide of Potassium*.  
Evan Ingstrum Pattengill, New York, *Fluid Extracts*.  
Edward Sing Petrie, New York, *Cinnamic Acid*.  
Harlan Page Pettigrew, Dakota, *Oils of Birch and Wintergreen*.  
William Chandler Pierce, Delaware, *Adeps Benzoinatus*.  
Henry Charles Plenge, South Carolina, *Aloin*.  
James Arthur Pool, Illinois, *Granulated Citrate of Magnesium*.  
Edmond Preston, Jr., Maryland, *Phytolacce Radix*.  
Elmer Delaney Prickitt, New Jersey, *Corn Silk*.  
Wm. Van Dyke, Reading, Pennsylvania, *Percolation*.  
William Reisert, Pennsylvania, *Bismuth Breath*.  
Charles Templeton Ritter, Pennsylvania, *Iron Preparations*.  
Joshua Ellis Rohrer, Pennsylvania, *Cardiophyllum Thalictroides*.  
Walter Arabin Rumsey, New Jersey, *Cornus Florida*.  
Frank Gibbs Ryan, New York, *Magnesi Carbonas*.  
Luther Johnson Schroeder, Pennsylvania, *Extractum Glycyrrhizæ*.  
Henry Francis Schuldt, Pennsylvania, *Guarana*.  
Edward Wolf Sharp, New Jersey, *Electricity*.  
Austin Charles Sherman, Pennsylvania, *Sublimation*.  
William August Singer, Illinois, *Estimation of Iron Ore*.  
George Ellsworth Spangler, Pennsylvania, *Aqua Pruni Serotina*.  
B. Franklin Stahl, Pennsylvania, *Acidum Hydrocyanicum Dilutum*.  
Charles Mays Steinmetz, Pennsylvania, *Elixirs*.  
Alexander Frederick Streitz, Nebraska, *White Wax and its Adulterations*.  
Clarence Draper Sypherd, Maryland, *Rhubarb*.  
Edward Weeks Tedford, Tennessee, *Department of Students*.  
James Harry Thomas, Pennsylvania, *Prinos Verticillatus*.  
Edwin Allen Trist, Pennsylvania, *Scutellaria Lateriflora*.  
John Henry Trout, Pennsylvania, *Chelidonium Majus*.  
Fred. Lang Urben, Pennsylvania, *Ether*.  
Frank Elliott Valentine, Ohio, *Infusum Digitalis*.  
Parry Wyche Vaughan, North Carolina, *Prunus Virginiana*.  
John Martin Broomall Ward, Pennsylvania, *Unguentum Aquæ Rosæ*.  
William Porter Watson, Pennsylvania, *Potassium*.  
John Alvin Weaver, Pennsylvania, *Guaiacum*.  
Alexander Arthur Weber, Pennsylvania, *Verbena*.



George Alcimus Weirich, Pennsylvania, *Boldo*.

Alfred Jefferson Wenner, New Jersey, *Oleic Acid*.

Anthony Smith Wickham, West Virginia, *Potassii Bromidum*.

George Thomas Williams, Delaware, *Syrupus Culeii Lactophosphatis*.

Elmer Ellsworth Wilson, Pennsylvania, *Pharmaceutical Manipulations*.

We have been prevented from obtaining the names of those who passed a meritorious examination.

The evening of March 18 saw the members of the graduating class and of the Board of Trustees together in the museum, to participate in the Professors' supper before bidding a final farewell to the graduates. The latter presented to the College a finely executed portrait of Professor Sadtler; various speeches were made and a few hours were spent in pleasant intercourse.

The formal closing of the sixty-third session of the College took place on the evening of March 19, at the Academy of Music where the commencement exercises were held and the degree of Graduate in Pharmacy was conferred upon the above candidates by the President of the College, Dillwyn Parrish. The following prizes were awarded: Mr. Jas. T. Shinn, on behalf of the Board of Trustees presented the Procter prize, a gold medal, to J. C. Falk, he having attained the grade "very satisfactory," in each of the seven branches of examination. The Secretary of the College, Mr. Wm. J. Jenks presented the Henry C. Lea prize, one hundred dollars, to F. X. Moerk for the best thesis, with honorable mention of Miss Grace L. Babb, H. L. Barber, J. Crawford, F. A. Dalpe, M. S. Falck, J. M. Hillan, A. H. Kinsey, J. McConn, T. McKenzie, T. O. Noek, E. S. Petrie, E. Preston, Jr., A. F. Streitz, F. G. Ryan, M. M. Osbourne, G. A. Weirich, and L. J. Schroeder. The materia medica prize, a Zentmayer histological microscope was presented by Vice-President Bullock, Prof. Maisch being absent on account of sickness; the recipient was H. L. Barber, and M. C. Falck received honorable mention, for the histological and chemical examination of an American drug. The Pharmacy prize, a gold medal, for a collection of Pharmaceutical preparations made without any special apparatus, was presented by Prof. Remington, to T. O. Noek, with honorable mention of P. W. Vaughan. The chemistry prize, a Troemner analytical balance, for analytical work, was presented to F. X. Moerk, with honorable mention of H. P. Pettigrew and O. Houck. Mr. Wiegand, on behalf of the Board of Trustees, presented to H. C. Cook the Prof. Maisch prize, twenty dollars in gold; offered by Mr. J. H. Redsecker, of Lebanon, Pa., for the best microscopical examination of drugs. Vice-President Shoemaker received for the absent Prof. Maisch from Mr. W. H. King, on behalf of the graduating class, a handsome group of Rogers' statuary.

The valedictory address was delivered by Professor Remington, and the exercises closed with the distribution of flowers and numerous presents which had been sent upon the platform by the friends of the graduates.

Seven students participated in the examination of microscopical specimens of drugs, in competition for the prize offered by Mr. Redsecker; three others, who had also attained the grade "very satisfactory," in the examination in materia medica, were absent from the city. The sections were prepared in such a manner that all cell contents were absent, and only the

tissues shown. They were *Apocynum cannabinum* (root), *Glycyrrhiza glabra* (rhizome), *Triticum repens* (rhizome), *Arnica montana* (rhizome), *Cinnamomum zeylanicum* (bark), *Cinchona succirubra* (bark), *Pimpinella anisum* (fruit), *Nux vomica* (testa and albumen), *Coffea* (albumen), *Lupulinum* (glands, dry). Each one of the specimens was identified; apocynum, glycyrrhiza, coffee and lupuline once; cinchona by six, cinnamon by five, the remainder by four and three students. Mr. H. C. Cook recognized six of the specimens.

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ALUMNI ASSOCIATION OF THE PHILADELPHIA COLLEGE OF PHARMACY.—The twentieth annual meeting was held in the room of the Association at the College hall, on Monday afternoon, March 17, 1884.

The President delivered his annual address, and the Secretary and Treasurer submitted their annual reports. The Executive Board held regular meetings during the year, and the Association had five social meetings during the winter, which were well attended by the students and members. The senior and junior quiz classes were a success, financially, also the class in microscopy. The spring class numbered six and the winter class 16 students. It was proposed to continue the spring course, as usual, in microscopy. During the year 95 graduates joined the association and seven died, leaving a membership of 833 at the close of the annual meeting.

The resolution was offered that a committee of five be appointed of the association to collect funds, and place in the vestibule of the College (by permission of the Board of Trustees) a tablet bearing the names of the original and such early members of the College as registered on the roll previous to 1823; the tablet to bear the inscription "erected by the Alumni Association of the College."

The following officers were elected for the ensuing year; President, Dr. Chas. A. Weidemann, class 1867; Vice-Presidents, Jacob S. Beeten, class 1878; Second Vice-President, Wm. R. Warner, Jr., class 1881; Recording Secretary, Wm. E. Krewson, class 1869; Corresponding Secretary, David W. Ross, class 1877; Treasurer, Edward C. Jones, class 1864; Executive Board, L. E. Sayre, class 1866; Jos. W. England, class 1883; Trustees of Sinking Fund, Thos. S. Wiegand, class 1844; Orator for 1885, Edward Hopper, Esq., class 1833.

The twentieth annual reception was held on the evening of the same day in the Pharmacy lecture room. The annual oration was delivered by Robert H. Vansant Ph.G., and the valedictory in behalf of the graduating class, by Wm. H. Gano. The usual Alumni prizes were awarded, viz.: Gold medal to John S. Falk, of St. Genevieve, Mo., and certificates in materia medica, to H. P. Pettigrew, of Sioux Falls, Dakota; in pharmacy, to Harry C. Cook, of Columbus, Ohio; in chemistry, to Frank G. Ryan, of Elmira, N. Y.; in operative pharmacy, to Grace Lee Babb, Eastport, Me.; in analytical chemistry, to Wm. L. Cliff, of Philadelphia; and in general pharmacy, to Henry C. Plenge, of Charleston, S. C. The junior testimonial was awarded to Wm. Henry Clark, of Madrid, N. Y.

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THE NEW YORK COLLEGE OF PHARMACY held its fifty-fourth annual

commencement in Steinway Hall, on the evening of March 18th. An account of the exercises and a list of the graduates has not been received.

ST. LOUIS COLLEGE OF PHARMACY.—The eighteenth annual commencement exercises were held at Memorial Hall on Wednesday evening, March 12th, 1884. The President of the College, H. E. Hoelke, delivered an appropriate address, and conferred the degree of Graduate in Pharmacy on the following candidates:

Henry H. Barth,	Adolph J. Hoenny,	Fred. Wm. Schumacher.
James M. Borton,	Wm. O. Kempinsky,	Arnold Sellner,
Oscar F. C. Bausch,	Otto Kollme,	Robt. H. Smiley,
Geo. G. Berg,	Chas. C. May,	Otis W. Smith,
Chas. H. Biermann,	Julius C. Meisenbach,	Wm. O. Steinmeyer,
Chas. F. Blank,	Chas. E. Meyer,	Chas. H. Stoll,
Wm. T. Carr,	Chas. Mueller,	Otto Sutter,
Fred. D'Amour,	Henry Muetze,	Joseph A. Temm,
Adolph G. Enderle,	Wm. E. O'Melveny,	Otto Ude,
Peter T. Entrekin,	Geo. L. Phelps,	Fred. Volz,
Wm. H. Fogas,	Louis Francis Reber,	August Vogt.
Emit W. Godron,	Edgar N. Sanders.	Geo. H. Wagner,
Louis C. Haagen,	Ernest C. Scholer,	Jno. W. Westman,
Henry J. Helwig,	Herman C. Schuh,	Francis Zerr.

Honorary mention was made of Adolph G. Enderle, Charles F. Blank, Henry Muetze, Francis Zerr, William O. Kempinsky, Henry H. Barth, Adolph J. Hoenny, Robert H. Smiley. The above names are given in the order of their general average of the examination in all branches.

The Alumni prize, a gold medal, was awarded by Francis Hemm to F. W. Schumacher, of Waco, Texas, for obtaining the highest proficiency in all branches. The valedictory address, on behalf of the class was delivered by James M. Borton, of Marion, Ill. A very interesting and instructive address, on the part of the College, was delivered by Rev. S. H. Sonneschein. After the distribution of many beautiful floral offerings and with enlivening music the exercises closed.

The College had an enrollment of 120 students during the session just closed.

THE MARYLAND COLLEGE OF PHARMACY held its thirty-second annual commencement at the Academy of Music, in Baltimore, on Tuesday afternoon, March 25th. The degree of Graduate in Pharmacy was conferred by President, Joseph Roberts, upon the following candidates:

Louis Bellerman, Maryland, <i>Tinct. Nucis Vomicae</i> .
Charles Buschman, Maryland, <i>Chemistry</i> .
Reinhart L. Brown, Ohio, <i>Boric Acid</i> .
E. J. Bernstein, Maryland, <i>Heat</i> .
Charles E. Davis, Pennsylvania, <i>C. P. Acids</i> .
John A. Davis, N. Carolina, <i>Resinoid Substances</i> .
William C. Downey, D. Columbia, <i>Hydrargyrum and its Compounds</i> .
William L. Dunham, Pennsylvania, <i>Chromium</i> .
J. K. Eppley, Maryland, <i>Pharmacy</i> .
Charles W. Forrest, Maryland, <i>Cantharis</i> .
John C. Groome, Pennsylvania, <i>Hydrargyri Chlor. Corros.</i>
H. H. Hatheway, Ohio, <i>Pharmacy</i> .
John M. Hennick, Maryland, <i>Carbon</i> .

George Kolb, Maryland, *Plumbum*.  
Louis F. Kornmann, Maryland, *Zinc*.  
Elmer E. Moyer, Pennsylvania, *Carbon*.  
Charles Metzger, Maryland, *Podophyllin*.  
William B. Orear, Maryland, *Eucalyptus*.  
Thomas L. Richardson, Maryland, *Pills and Pill Excipients*.  
Thomas K. Shaw, Maryland, *Cannabis Indica*.  
W. L. Sulzbacher, Ohio, *Pepsin*.  
George H. Stuart, Maryland, *Powdered Extracts*.  
Charles Shipley, Maryland, *Ergot*.  
Frederick Sultan, Maryland, *Salicylic Acid*.  
Conrad P. Strauss, Maryland, *Citric Acid*.  
Louis Schultze, Maryland, *Hydrargyrum*.  
Purnell F. Sappington, Maryland, *Belladonna*.  
W. B. Taliaferro, Virginia, *Analytical Chemistry*.  
J. Curtis Treherne, Virginia, *Cinchona Preparations*.  
J. Henry Woodcock, N. Carolina, *Sulphur*.

The College prizes, gold medals, were awarded to C. P. Strauss, W. L. Sulzbacher and L. F. Kornmann; the Simon analytical prize, a gold medal, to F. W. Sultan; the Practical Pharmacy prize, a Troemner Solution Balance, to T. L. Richardson, and the prize to the Junior class, a copy of Hoffmann and Power's Analytical Chemistry, to Lee M. Whitsitt. The valedictory Address was delivered by Rev. C. E. Felton.

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## EDITORIAL DEPARTMENT.

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PARTIAL DESTRUCTION OF POWERS & WEIGHTMAN'S LABORATORY.—Shortly after 12 o'clock on the morning of February 29th, a portion of the western wing of this laboratory was discovered to be on fire. It originated from some unknown cause in the third story of the building, in a locality where cinchona bark was ground, and when first seen by the watchmen was not considered to be of sufficient magnitude to summon outside aid. But the steam pumps of the establishment proving unavailing to subdue the fire, an alarm was sounded which brought the fire department to the spot. A fierce northwest gale fanned the flames which were nourished by the combustible material within the building, and gradually spread to the southwestern end where the carpenter shop was located, and thence eastward along Brown street, and to the buildings which had been erected in the central yard. All these buildings were of a very substantial character, which helped very materially to confine the destructive element, notwithstanding the high wind and the intensely cold weather. The fire raged until after daybreak, when it was under sufficient control to prevent it from spreading further, but it continued to burn and to smoulder for many hours afterward.

Most of the burned buildings had been erected in the place of those which had been destroyed by fire just sixteen years before, on February 29, 1868. The principal chemicals destroyed were quinine, morphine, chloroform, potassium iodide and others, mostly such as were in course of preparation. The northern half of the extensive establishment along Parrish and Ninth streets was saved; it is here where the counting room, the extensive store-



rooms and other important departments are located. Several large warehouses belonging to the firm, are in the immediate neighborhood at a short distance from the scene of conflagration; these were not touched by the fire. A large portion of the laboratory works, where acids and other heavy chemicals are mainly manufactured, is located at Schuylkill Falls, a distance of several miles from the burned buildings.

The ruins are being taken down, and new buildings will soon take the place of those destroyed. We understand that the firm has leased a factory at Mannheim, Germany, where for awhile quinine will be manufactured, and that it is the intention of transferring a portion of the manufacturing department to the extensive grounds at Schuylkill Falls.

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THE OHIO PHARMACY LAW was finally passed March 20th, after a struggle of several years. We learn that this result has been reached in good part through the interest taken in the bill by Senator Reed and by Dr. Lisle, the Chairman of the Committee on Medical Colleges and Societies in the House.

The provisions of the law are simple. The Ohio State Pharmaceutical Association makes nominations; from these names and others the Governor appoints the Ohio Board of Pharmacy, consisting of five members, one of whom retires every year and another appointment is made for five years. The Secretary of the Board receives a salary and payment for traveling and other necessary expenses; the other members receive three dollars for each day of service and legitimate expenses; the surplus money is to be invested as a special fund. Those engaged in the drug business are required to register within three months; likewise the assistants, who are at least 18 years of age and have been employed in the prescription business for at least three years. All others are hereafter required to undergo an examination, previous to registration; for the latter a fee of \$3 is to be paid by pharmacists and \$2 by assistant pharmacists, and a triennial renewal of this license is required at a charge of \$1 and 50 cents respectively. Complete returns are to be made annually to the Secretary of State and to the Ohio Pharmaceutical Association. The book of registration is to be kept at Columbus; the Board is to hold three regular meetings at Cincinnati, Columbus and Cleveland, and other meetings as may be necessary. Prescriptions may be compounded by registered pharmacists or qualified assistants or under their supervision, by others. The certificate of registration is to be conspicuously displayed. The law does not interfere with physicians supplying their patients with medicines, nor with the manufacture of proprietary medicines, nor with the business of country stores who may sell drugs in common use, like castor oil, senna, sage, juniper berries, licorice, etc.; also chemicals, like copperas, borax, blue vitriol, saltpetre, sulphur, Epsom salt, Glauber's salt, cream of tartar and bicarbonate of sodium; also certain preparations when compounded, put up and properly labeled with directions for use, by registered pharmacists or wholesale dealers, namely, paregoric, essence of peppermint, essence of cinnamon, essence of ginger, hive syrup, syrup of ipecac, tincture of arnica,

syrup of tolu, syrup of squill, spirit of camphor, number six, spirit of nitre, compound cathartic pills, quinine pills and "other similar preparations."

The violation of any of the provisions of the law is declared to be a misdemeanor, and involves a fine of not exceeding \$50 for each offence, such fine not to affect the right to bring civil actions; the fines are to be placed in the county treasury for the benefit of the common school fund.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

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*Proceedings of the Fifth Annual Meeting of the Missouri State Pharmaceutical Association*, held at St. Louis, October 23d to 25th, 1883. Svo. pp. 57.

A brief account of the transactions at this meeting was published in "Amer. Jour. Pharm.," 1883, p. 633. The next meeting will be held in Brownsville, on the second Tuesday of June.

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*Bericht über Pharmaceutische Produkte, incl. künstliche Mineralwasser.*  
Von Prof. Ed. Schaer. Zürich, 1883. Svo, pp. 39.

*Report on Pharmaceutical Products, including Artificial Mineral Waters.*

At the Swiss national exhibition held last year, the crude drugs and the preparations used in medicine were classed among two different groups. Without entering into a description of the crude articles, Prof. Schaer gives a full and interesting report on the various products, which he classifies as follows:

1. Pharmaceutico-chemical preparations, like salts of metals and alkaloïds, tartrates, benzoates, ethers, etc.

2. Galenical preparations, like syrups, tinctures, extracts, ointments, powders, etc., also fluid extracts, which are beginning to be used on the continent of Europe. Among the plants which are almost unknown here, and of which various preparations were shown, may be mentioned *Dentaria pinnata*, *Myrrhis odorata* and *Achillea moschata*, or *iva*.

3. New forms and so-called elegant preparations, like dosimetric granules, rectal and vaginal suppositories, bougies, medicinal pencils, compressed tablettes, gelatin and other capsules, etc.

4. Artificial mineral waters in syphons and bottles, and

5. Dietetic-medicinal preparations, mainly milk-sugar, lactin and extracts of malt; the latter, aside from those which are medicated with quinine, iron, etc., are prepared of two kinds, namely, the ordinary kind, which is free from diastase, and for special purposes, particularly in the treatment of children, an extract containing diastase.

The report contains much valuable information on this branch of the industry of Switzerland, and occasionally some pertinent remarks on the claims of the products exhibited.

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*International Review of Medical and Surgical Techniques.* Official organ of the American Association of the Red Cross. Published quarterly. Boston, Mass.: International Medical Exchange.

*Ueber das Suberin.* Ein Beitrag zur botanischen, pharmacognostischen, und chemischen Kenntniss des Korkes von Quercus Suber. Von Karl Kügler. Halle a Saale, 1884.

*On Suberin.* A contribution to the botanical, pharmacognostical and chemical knowledge of the cork of Quercus Suber.

The work for this thesis has been done at the University of Strassburg, and comprises more particularly the history of the development of cork, the formation of cork-cells and the chemical constituents of corks. Air-dry cork leaves between '53 and '64 per cent. of ash, of which lime and manganese form each over 25 per cent. Chloroform extracts from cork 12 to 13 per cent of soluble matter, about one third of which consists of Höhnell's crystallizable *cerin*  $C_{20}H_{32}O$ , (not to be confounded with cerotic acid of wax, which was formerly called cerin.) Boiling alcohol now extracts from cork between 5 and 6 per cent. of tannin and phlobaphene. On boiling the cork now with an alcoholic solution of potassa, suberin was extracted and decomposed into glycerin (2.65 per cent.) and fatty acids (30 per cent.) the latter consisting of stearic and *phellonic acid* ( $C_{22}H_{42}O_4$ ); a little couiferin was likewise obtained and converted into vanillin. Water subsequently extracted 3 per cent. of humin compounds, and left 22 per cent. of cellulose. Though suberin is a fat, it cannot be extracted from cork by simple solvents, because it is doubtless intimately inclosed by the cellulose molecules. The oxidation products obtainable from cork by means of nitric acid, like suberic, oxalic, azelaic, cerinic, etc., acids are derived from the fatty acids, and the cerinic acid is regarded as a mixture of various compounds.

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*Materia Medica e Therapeutica Brasileira. Vegetaes tonicos.* These inaugural pelo Dr. Francisco Maria de Mello Oliveira, etc., Rio de Janeiro, 1883. 8vo, pp. 144.

*Brazilian Materia Medica and Therapeutics.* Vegetable tonics.

The flora of Brazil, like that of other tropical countries, is rich in medicinal and otherwise useful plants. Several of these have found a permanent place in the materia medica of most civilized countries; others have occasionally been used, and many others might doubtless be employed with more or less success. The treatise before us is confined to plants possessing tonic properties, and does not pretend to be exhaustive of this class. We observe there accounts of such well known plants and their products, like guarana, maté, coffee, coca, cacao, remijia, cinchona, dorstenia, vanilla and others, besides a large number of other plants which are less known outside of Brazil. The accounts of these plants embrace descriptions of the plants and drugs, the chemical constituents and medicinal properties. Besides a number of wood cuts, the pamphlet contains good lithographs of *Tachia guyanensis* (*caferana*) and *Cinchona Calisaya* (*cultivated*).

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*Cumberland Almanac for the Year 1884.* Nashville: American Publishing Company.

This Almanac was furnished to the subscribers of the "Journal of Medicine and Surgery," Nashville.

# THE AMERICAN JOURNAL OF PHARMACY.

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MAY, 1884.

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## A SKETCH OF THE LIFE OF ROBERT BRIDGES, M. D.

BY W. S. W. RUSCHENBERGER, M. D.

*Read before the American Philosophical Society, February 15, 1884.*

A man whose honest conduct and toil through a long life contribute, in any marked degree, towards the comfort or enlightenment of his fellows, or the good name of the community in which he lived, earns a claim to kindly remembrance after he has left the field of his labor forever. It is good for the living to know something of his ways and services, though he may not have won a foremost place among the leaders of science or of letters. Even an imperfect sketch of the life of a man who has striven to increase or to diffuse knowledge is more or less valuable, because it may incite others to emulate his example, and toil patiently among followers till qualified to fill a chief's place. If the reputation of a workman is in proportion to the quality and quantity of his work, then a fair relation of what Dr. Bridges has done will suffice to secure, without aid of rhetoric, the degree of encomium which his life deserves in this connection. A kind and generous disposition enhanced the merit of his work. He did much that brought no pay beyond the satisfaction which comes from doing to help others, and to contribute to the common progress. His life was characterized by uniform, unremitting labor.

The details of this sketch may be somewhat tiresome, but, as they contain the gist, all the testimony in the case, they may be patiently heard, at least, if not excused.

The ancestry of Dr. Robert Bridges is traced to Edward Bridges, who, in 1648, was a lieutenant of the English Army. Edward, his eldest son, who was an architect, married in 1692. He left two sons. The elder, named Edward, married Catherine Bullen. He was a merchant in Cork. He had six sons and two daughters. Edward, the eldest of the sons, who also was a merchant in the city of Cork,



married a second wife in Rotterdam, Cornelia, the second daughter of Thomas Culpeper, of Kent county, England. By her he had four children. Edward, their third son, settled in Philadelphia, and, in 1739, was established at a corner of Front and Walnut streets, in the dry goods trade. His place of business was commonly called "the Scales." He left three sons: Edward John, who was born in Rotterdam, in 1736, and died in Jamaica, Surgeon of the *Africa*, a sixty-four gun ship; Culpeper, who died a midshipman on board of the *Northumberland*, at the siege of Louisburg, Cape Breton, 1758, and Robert, who was born in Philadelphia, November 18, 1739, and married, in 1769, Jemima Sheppard, of Bensalem township, Bucks county, Pa. He had five sons, Barnsley, Robert (who probably died young), Culpeper, Robert and Edward; and five daughters, Cornelia, Mary, Sarah, Harriet and Emily. Robert Bridges was a sailmaker. His residence was at (old number) 259 South Front street, and his sail-loft was on the wharf, Delaware avenue, north of Lombard street. James Forten, an almost "colorless colored man," was his foreman, and, in 1800, when Robert Bridges died, succeeded him in business. Culpeper Bridges, the third son of Robert, the sailmaker, was born in Philadelphia, December 21, 1776, and died December 29, 1823. He was trained to be a merchant by John Leamy, whose "counting-house" was at the southeast corner of Walnut and Third streets. He married, February 21, 1804, Sarah, the fifth daughter and eleventh child of William Clifton, of Southwark, a blacksmith and machinist, and had two sons, William Clifton, and Robert, the subject of this sketch, who was born in Philadelphia, March 5, 1806.

This outline of lineage, which is purely English, implies that the ancestors of Dr. Bridges, were vigorous, enterprising, intelligent, industrious and respectable.

Both sons were liberally educated; both were pupils in the University Grammar School. William Clifton graduated from the department of arts of the University of Pennsylvania in 1821. Robert was for a short time one of the sophomores of the University—there was no freshman class at that period—and then, for no assigned reason, entered Dickinson College, Carlisle, Pa., from which he graduated in 1824. In July of the same year he was elected a member of the Societas Philosophiæ Consociata of the College.

Immediately after his return to Philadelphia he became a pupil of Dr. Thomas T. Hewson, and remained under the instruction of that

eminent medical teacher and surgeon nearly four years. He had associated with him, in teaching his large class of students, several assistants. His office was a two-storied house, on the north side of Library street, near to Fourth street. In it were a students' reception-room, a laboratory and a lecture-room, and, in the rear of the house, a dissecting-room. In Dr. Hewson's private medical school Dr. Franklin Bache taught chemistry. He appointed young Bridges his assistant very soon after he began his medical studies. In this capacity he served Dr. Bache through many years in the courses of chemical lectures delivered by him in the Franklin Institute, in the Philadelphia College of Pharmacy, and at the Jefferson Medical College. This practical training made him an expert chemist and an admirable teacher of chemistry.

His close attention, habitually given to whatever he might be doing, qualified him in a high degree to assist the lecturer on chemistry. In May, 1827, upon pouring water into an iron mercury flask, which had been used for obtaining oxygen from nitre, for the purpose of washing it, he noticed a lively effervescence. He proceeded at once to investigate the nature of the gaseous matter, and found it to consist of oxygen of a purity of ninety-five per cent., as he ascertained by Dr. Hare's accurate sliding-rod eudiometer. He observed the same phenomenon, November 27, at the Franklin Institute, and found in this instance that the oxygen contained only one per cent. of impurity. He suggested that this residuum, which Dr. Hare conjectured to be peroxide of potassium, would furnish pure oxygen to the experimenter without trouble. He was anticipated in this discovery. Mr. Richard Philips, of London, had made the same observation and given the same rationale of the phenomenon, an account of which he published in the "Annals of Philosophy" for April, 1827. Nevertheless, Dr. Franklin Bache published in the "North American Medical and Surgical Journal" for January, 1828, a note of the observation of "Mr. Robt. Bridges, student of medicine," on the Residuum of Nitre after Exposure to Red Heat." The circumstance indicates his character as a student, and at the same time Dr. Bache's kind appreciation of his worth.

Dr. Bridges graduated from the medical department of the University of Pennsylvania, March, 1828. "Neuralgia" was the subject of his thesis. He immediately opened an office at the southeast corner of Vine and Thirteenth streets, where he remained till 1837. He did

not obtain a lucrative practice. His mother died, February 19, 1839, in the fifty-eighth year of her age, a loss generally among the saddest in man's experience.

He was elected a member of the Academy of Natural Sciences of Philadelphia, January, 1835; of the Franklin Institute, January, 1836; a resident member of the Philadelphia College of Pharmacy, December, 1838; a fellow of the College of Physicians of Philadelphia, July, 1842; and he was chosen a member of the American Philosophical Society, January 19, 1844.

At the Franklin Institute Dr. Franklin Bache taught chemistry, as lecturer and professor,<sup>1</sup> from September, 1826, till 1831. During the whole period, five years, Dr. Bridges was his assistant. After that time he did not participate in the proceedings of the Society, though he was occasionally present at its meetings.

As already stated, he was an active and prominent member of the Academy of Natural Sciences, but all his time was not given to it. He labored most earnestly in another institution, the Philadelphia College of Pharmacy, with which his career was so closely associated, that, to understand it clearly, a statement of the circumstances which attended the origin and progress of the College seems necessary.

A National Convention of Physicians assembled at Washington, D. C., January 1, 1820, for the purpose of devising a code of formulas, and establishing it as the sole standard for medicinal preparations. The object was to have them made exactly alike in composition and strength by all physicians and apothecaries throughout the land. The result of the labors of the convention of January, 1820, was the publication, at Boston, Mass., December 15, 1820, of the first Pharmacopœia of the United States of America, and since, of decennial revisions of it, the sixth of which is now in use.

Dr. Bridges was among the most skillful of those who labored to perfect the Pharmacopœia. The Philadelphia College of Pharmacy appointed him, March, 1847, one of a committee to revise the issue of 1840, and prepare the report on it to be given to the National Convention of 1850, the first in which pharmacists were represented. He assisted on a committee of the College of Physicians, appointed February, 1868, to report on the fourth decennial revision; was one of the delegates from the college to the meeting of the National Conven-

<sup>1</sup> Dr. Bache was appointed lecturer on chemistry, September, 1826, and professor, March, 1828.

tion of 1870, and was a member of the Committee on Publication of the fifth decennial revision. In July, 1877, the College of Physicians appointed him one of a committee to revise the Pharmacopœia of 1870, and prepare a report on it for the National Convention of 1880.

About the time when the first National Convention met, the drug and apothecary business was regarded as a trade rather than as a profession based on scientific principles, as it is now. It was known that deteriorated drugs were sold, and that valuable preparations in daily use were adulterated or made of materials of inferior quality. Such abuses were charitably ascribed to ignorance of pharmacy which was supposed to prevail among druggists and apothecaries generally.

To remedy this lamentable condition of the apothecary's vocation, some three score of intelligent, philanthropic men, including a large proportion of members of the Society of Friends, associated in this city and founded, February 23, 1821, the Philadelphia College of Pharmacy, a society which was incorporated, March 30, 1822, with all legal authority necessary to establish and support a school of pharmacy. The University of Pennsylvania had then recently provided for teaching pharmacy in connection with materia medica, and conferring the degree of Master of Pharmacy, which was conferred the first time in the spring of 1821 on sixteen graduates. This action of the University, it was said, greatly influenced, if it did not determine, the formation of the society known as the Philadelphia College of Pharmacy.

It consists of active or resident, honorary and corresponding members. The conduct of its ordinary affairs is confided to eighteen trustees, one-sixth of whom are elected semi-annually by the college. The stated meetings of the board of trustees are monthly, and of the college, quarterly.

The first courses of lectures, which were limited to materia medica and chemistry, were given in the winter of 1821-22, but the degree of "graduate of pharmacy" was not conferred till the spring of 1826, when there were three graduates. The lectures were delivered in a building on the west side of Seventh, between Market and Chestnut streets, the site of which is now occupied by the Gas Office of the city.

In 1832 the society erected for its use a building on the south side of Zane, now Filbert street, west of Seventh, and occupied it until the



college was established in its present well-adapted quarters, No. 145 North Tenth street, September, 1868.

Under the authority of the Society, the "American Journal of Pharmacy," which is devoted to the advancement of pharmaceutical knowledge, and the advocacy of thorough education of pharmacists, was established in 1825. It was issued quarterly, till 1853, then bi-monthly till 1871, since that date, monthly, and continues to be a prosperous periodical. Dr. Bridges was assistant editor of this journal about six years, from 1839 till 1845, and contributed several original papers to it.

The college grew very slowly. But the strict probity observed in its management and the great care taken to select only the most competent and conscientious teachers, have enabled it to surmount all impediments in the way of its progress. Now, graded courses of instruction are given on materia medica, botany, the theory and practice of pharmacy, chemistry (practical and analytical), and pharmaceutical manipulation, by a faculty consisting of four professors and three assistants. The teaching is very thorough. Since the establishment of the school, 7,109 students have matriculated, upon 2,049 of whom, 28.82 per cent., the degree of graduate in Pharmacy has been conferred.<sup>1</sup> •

Dr. Bridges entered the college, May, 1831, as private assistant of the professor of chemistry, Dr. Franklin Bache, and was elected an active member of the society December 18, 1838, and, March 25, 1839, a member of the Board of Trustees, and also of the Publication Committee, to which he was annually elected, till 1861, twenty-one years, when he declined re-election. He was elected chairman of the Board of Trustees, October 9, 1860, and, being annually re-elected, held the position till the close of his life. When Dr. Bache gave up the chair of chemistry to take the professorship of the same department in the Jefferson Medical College, Dr. Bridges was a candidate for the vacant place, but Dr. Wm. R. Fisher was elected, May 31, 1841, by a majority of two votes. He resigned the following April, and Dr. Bridges was unanimously elected Professor of General and Pharmaceutical Chemistry, May 16, 1842. Still he continued to be the private assistant of Dr. Bache, till his death, in 1864, severed their continuous laboratory association of forty years. Dr. Bridges, also aided Dr. George B.

<sup>1</sup> Sixty-third Annual Announcement of the Philadelphia College of Pharmacy, 1883.

Wood in his work while he held the professorship of materia medica in the University of Pennsylvania, from 1835 till 1850.

Besides the routine work of the professorship, Dr. Bridges did his full share on standing and special committees, delivered many introductory and other addresses, and represented the College among its delegates to the American Pharmaceutical Association and other bodies.

The painstaking and kindly ways of Dr. Bridges in teaching, won for him affectionate and enduring respect from those whom he taught. At the commencement, March, 1867, a portrait of him in oil, was presented to the college by the Zeta Phi Society, and the graduating class, at the commencement, March, 1877, presented to him a stem-winding gold watch.

The additional labor imposed by adopting the method of teaching in graded courses, induced Dr. Bridges, in June, 1878, to procure an assistant. And in January, 1879, at a meeting of the Board of Trustees, he stated informally that his impaired health constrained him to announce that he would relinquish the chair of chemistry at the close of the course. On hearing of his intended resignation, the graduating class of one hundred and fourteen members, representing eighteen States, held a meeting and adopted a preamble and resolutions, expressing regret, sympathy, and for themselves as well as their predecessors, "profound respect for Dr. Bridges as a chemist, and their most grateful esteem for him as their friend and instructor," and earnestly invoking the divine blessing upon his remaining years.

He tendered his resignation in a letter dated March 4, 1879. At a meeting of the Board of Trustees, March 14, a preamble and resolutions were unanimously adopted, stating in substance that he had devoted his time and abilities to a conscientious discharge of the trust assigned him for a long period, during which the professors received a scanty remuneration, that "to his sound judgment and patient labor" the success of the college is much indebted; that the good work he has accomplished has its record in those who have been his pupils in the college—about five thousand—and that he has the sincere thanks and sympathy of the Board.

At the celebration of its twenty-fifth anniversary, March 11, 1879, the Phi Zeta Society, which is composed of alumni of the college, created a scholarship and named it the Robert Bridges scholarship, as

a token of its high estimation of his character and official services. The Board of Trustees, after due deliberation, "in view of his faithful and efficient labors," conferred upon him, May 6, 1879, the title of Emeritus Professor of Chemistry, with an annual salary of one thousand dollars, to be paid in equal installments quarterly, in advance, during his life, from the first day of July ensuing.

In the spring of 1842, the Philadelphia Association for Medical Instruction was formed. The constituent members or founders of it were Dr. John F. Meigs, who taught obstetrics till 1845, and afterwards lectured on the diseases of children; Dr. Joshua M. Wallace, who taught surgery; Dr. Robert Bridges, chemistry; Dr. Francis Gurney Smith, Jr., physiology; and Joshua M. Allen, anatomy. Dr. Bridges was the only constituent member of the Association who remained in it until it was dissolved at the close of 1860, a period of eighteen years. Several retired to accept professorships in medical colleges, and their places were supplied by new appointments, so that during the career of the Association the names of many distinguished physicians are recorded on its list of members.<sup>1</sup>

Dr. Bridges was elected professor of chemistry in the Franklin Medical College in 1846, and filled the office till the institution was dissolved in 1848.

His contributions to medical and scientific literature are valuable, but not very numerous. His papers in the "American Journal of Pharmacy" are entitled, "Chemical Symbols," and "Pyroacetic Spirit and its Derivative Compounds," in 1839; "The Manufacture of Sulphuric Acid," and the "Adulteration of Lac Sulphuris," in 1840; "Notice of Professor Kane's Researches on Ammoniacal Compounds," "Poisoning by long continued use of Acetate of Lead," in 1841; "Observations on two species of *Aristolochia* which afford *Serpentaria*," "Observations on the Action of Ether on Galls," "Report on Procter's Hydrated Peroxide of Iron," in 1843. "Experiments on the Absorb-

<sup>1</sup> David H. Tucker, William V. Keating, J. H. B. McClellan, Ellerslie Wallace, Addinell Hewson, John H. Brinton, S. Weir Mitchell, Alfred Stillé, Morton Stillé, J. M. DaCosta, Francis West, James Darrach, and Edward Hartshorne, were teachers in this Association. Including the constituent members, a corps of better qualified instructors than those associated in this summer school could not be easily found anywhere.

ing Power of Anthracite," "Precipitated Carbonate of Lime," "Solution of Iodide of Iron," "Solidification of Carbonic Acid," in 1844; "Pil. Hydrargyri," in 1846, and "Southern Prickly-Ash bark," in 1865. In July, 1845, Dr. Bridges "edited with additions" the American reprint of "Elementary Chemistry, Theoretical and Practical," by George Fownes, and subsequently several editions of this popular volume. The latest American, from the twelfth English edition of the work, was issued May, 1878. He also edited, 1852, the American reprint of Graham's "Elements of Chemistry." From 1854 till 1877, inclusive, he contributed very many bibliographical notices and reviews, chiefly of works on chemistry, to the "American Journal of the Medical Sciences." He assisted Dr. George B. Wood in the preparation of the twelfth, 1865, the thirteenth, 1870, and the fourteenth, 1877, editions of the "United States Dispensatory," a leading work on materia medica and pharmacy of such acknowledged excellence and accuracy as to be generally accepted as authority in the premises.

During the last few years of his life, Dr. Bridges endured most patiently the constant molestations and frequent pain, which attend chronic cystitis. His repose at night, broken into a series of hourly naps, did not bring to him for the next day the refreshing effect of normal sleep; and so his physical vigor was continuously abated, and his mental pursuits greatly disturbed. But in spite of worry from this condition of his health, he was serenely cheerful and manifested his usual interest in scientific topics. Within a few days of the completion of the seventy-sixth year of his age, he died, February 20, 1882, in the house he had occupied with his brother and family twenty-eight years.

He was never married. His generous and sympathetic kindness, self-sacrificing spirit and habitual amiability won the almost filial love and respect of his brother's many children. Their devotion to him is conclusive evidence of his domestic qualities and the tenderness of his nature.

Frugal in his living, punctual and loyal to all duties, accurate, learned, unremittingly industrious, rigidly self-respecting and pure in conduct in every sense, he worked faithfully throughout his long life, but did not reap compensation commensurate with his toil. He lacked of that self-asserting, aggressive spirit which leads many a good man to fortune under circumstances in which one of far greater intrinsic worth often fails only because he is too shy, too modest to assert his



claims to consideration. He was always content to leave to others the appraisement of his worth. Without being ready in debate or at all eloquent in speech, he was an admirable and efficient teacher, as thousands of his pupils can testify. They will teach his lessons and thus long continue and expand the beneficent influence of his instruction and example.

Though he was baptized in the Protestant Episcopal Church, and was occasionally present at its services, he seemed to hold views in harmony with the tenets of the Society of Friends, of which his mother and her ancestors were members.

Dr. Bridges was notably reticent about himself among his most intimate friends. He left no letters or papers bearing testimony to his merits. A friend who had been intimate with him during a third of a century, says, in a letter, September 10, 1881: "Few men in this world—and I have met many who are good and generous—have ever, in my judgment, with such self-sacrificing generosity, bestowed as heartily their sympathy and their best efforts to gladden the lives of those around them, as our friend Bridges has always done. And the quiet, earnest and unflagging way in which he has bestowed the best energies and all the small rewards of his life among his friends is beautiful to behold. \* \* \* \* \*

"I am quite surprised to hear that he is able and enjoys so much exercise as to go twice a day to the cool hall of the Academy to read in the library. I am very glad of it, and, especially, as he will there have the benefit of the refreshing atmosphere of that large room; and will enjoy the very best thing for him, not unfrequent meeting with old acquaintances, and always find most congenial topics of conversation. I never shall forget the force with which, before I was well acquainted with Dr. Bridges, an assertion of Leidy one day struck me. Leidy said, he thought he had as much broad and general knowledge and accurate learning as could be found among us, and that he was a man of most sound and solid judgment. This I have found to grow upon my convictions of his mind and acquirements for the period of thirty-three years since Leidy spoke of him so sincerely and soundly."

His knowledge of natural history in general was extensive, accurate and always at command. He was a well-informed botanist, thoroughly versed in materia medica and chemistry, and a skillful practitioner of medicine. Naturally modest, almost shy, his manner to strangers was somewhat reserved, but cordial with his friends, all of whom regarded

him with affectionate respect, because they recognized his perfect integrity, sincerity, extensive learning and good sense.

In the annual oration before the Alumni Association of the Philadelphia College of Pharmacy, March 13th, 1882, Prof. Frederick B. Power spoke of him as follows:

"I cannot refrain from adding my tribute to the memory of him whose loss we have so recently been called upon to mourn—the late Professor Dr. Robert Bridges. His faithful teachings during an unparalleled period of service of nearly forty years will long be held in grateful remembrance by those who were permitted to listen to his instructions, while his generous and noble nature, so beautiful in its simplicity, so approachable and free from ostentation, had endowed him with attributes well worthy of emulation, and endeared him to his pupils by ties of affection which will be ever fondly cherished."

In his valedictory address to the graduates of the college, March 15th, 1882, Professor Samuel P. Sadtler said:

"The Philadelphia College of Pharmacy has just lost, in the death of Professor Robert Bridges, her Emeritus Professor of Chemistry, one, who, while he added much to her present substantial reputation, will be remembered and revered by those who knew him, chiefly because of his eminently loveable and unselfish character, his devotion to duty, and his faithful labors for the institution with which he was so long and so honorably connected. If we, younger men, and especially you, young gentlemen, just about starting upon your life's career, will emulate these qualities of character, we may expect some day, when the curtain drops upon the drama of our life, to have it said of each of us, as it is now said of him, 'his was a noble life.'"

## ALCOHOL TABLES OF HEHNER AND OF PILE.

BY A. B. LYONS, M. D., Detroit, Michigan.

Two voluminous alcoholometrical tables have recently been placed before the public, and more especially brought to the notice of pharmacists. The labor that has been expended in preparing them is evidence that their respective authors were convinced that they were rendering the world an important service, and this we are not disposed to question. It is in order, however, to discuss the absolute and relative merits of these rival tables. Impartial criticism may be of service in giving direction to any further work which may be undertaken in this field.

The first general observation to be made in regard to these tables is that for ordinary use they are quite too voluminous. Hehner's table occupies fourteen pages of a volume which should contain as little superfluous matter as possible. A table extending not beyond two pages would be much more convenient for reference, and might easily be constructed so as to comprehend more than the present table.

Pile's table, published in the February number of the "*Journal of Pharmacy*," is equally diffuse, coinciding indeed, line for line, with that of Hehner. The principle on which these tables are constructed is, in fact, radically vicious. A difference of  $\cdot 0001$  in specific gravity in a spirit containing eighteen per cent. (vol.) absolute alcohol will correspond to a difference of one-tenth of one per cent., nearly, in strength, whereas the same difference in specific gravity in a spirit containing ninety-nine per cent. of alcohol, will indicate a difference in strength only one-fifth as great. The second page of the *Pharmacopœia* table thus contains volume percentages, ranging from 9 to 23, while the thirteenth page, with the same number of figures covers only the interval between  $93\frac{1}{4}$  and 97 per cent., and that, too, in a portion of the table which one has very rarely occasion to consult. One is reminded of a map drawn on Mercator's projection, on which the frozen polar regions are expanded out of all proportion to their importance.

The labor of interpolating values between those of the ordinary tables is in itself trifling, and it may be reduced to a minimum by adding a column of differences, or still better, a column containing the factor corresponding with a difference of  $\cdot 0001$  in specific gravity between consecutive terms, and for practical purposes, the necessary subtraction and multiplication could be made mentally, in less time than is now required to turn over the leaves in search of the required figure.

One important feature is conspicuously absent, which ought by all means to form a part of any complete alcoholometrical table. I refer to the temperature corrections which one has constantly to employ in practice.

These errors of redundancy and deficiency are common to both the tables. We come now to a comparison between them on the vital point of the relative and absolute accuracy of their figures. In general it may be said that in both Hehner's and Pile's tables, the mathematical computations have been performed with commendable precision. I have not had the time to examine all the figures, but it is

safe to say that they are nearly perfect in this regard. In the table of the Pharmacopœia, several misprints have escaped correction. I note the following: corresponding with sp. gr. .9180, vol. per cent., 58.92 should be 57.92; sp. gr. .8215, vol. per cent. 83.62 should read 93.62; sp. gr. .8161, vol. per cent. 94.00 should read 95.00. But the error in each case is so obvious that it could rarely occasion mistake.

Pile distinctly states that he bases his table upon that of Tralles. It is easy to see that Hehner's, on the other hand, is merely an amplification of that of Fownes, with a few unimportant variations. The figures of the two tables differ materially, but not by any means so greatly as would appear from the tabulated comparison given by Mr. Pile (*"Jour. of Pharmacy,"* February 1884, page 71). From these figures there would seem to be a difference between them amounting in some cases to more than one per cent. But it must be remembered that Hehner's table takes water at 60° F. as unity, while in Tralles' table, water at its maximum density is the standard adopted. Reducing the figures to a common standard, we shall find that the maximum difference, does not exceed one-fourth of one per cent. The corrected figures are as follows:

Specific Gravity.	TRALLES.		HEHNER.	
	Weight.	Volume.	Weight.	Volume.
.9991	0.00	0.00	0.00	0.00
.9857	8.05	10.00	8.22	10.22
.9751	16.29	20.00	16.47	20.25
.9646	24.69	30.00	24.78	30.14
.9510	33.39	40.00	33.55	40.23
.9335	42.52	50.00	42.60	50.14
.9126	52.19	60.00	52.04	59.88
.8892	62.50	70.00	62.36	69.92
.8631	73.59	80.00	73.43	79.91
.8332	85.75	90.00	85.67	90.01
.7939	100.00	100.00	99.73	99.83

Carrying the comparison through the whole of the two tables, I find the range of variation hardly greater than it appears in these selected figures. Such a variation, for ordinary purposes, is not of very great importance, although in tables which profess to discriminate differences



of one-tenth to one-fortieth of one per cent. we ought not to expect any such large margin.

According to Hehner (Fownes) the specific gravity of absolute alcohol is  $\cdot 7938$ ; according to Pile (Tralles) it is  $\cdot 7939$ . Were the same unit adopted by the two authorities, these figures might be considered practically identical, but in fact the difference is  $\cdot 0008$ , amounting to nearly one quarter of one per cent. Mr. Pile deliberately adopts his value as established beyond question, quoting a legal enactment of the United States as authority, which places the matter beyond dispute. He says: "Hehner began his tables by denoting the specific gravity of water as  $1\cdot 000$  at  $60^{\circ}$  F., but at the end of his table, we find absolute alcohol indicated by a specific gravity of  $\cdot 7938$ , which is the case when compared with water as unity at  $39^{\circ}$  F., but when water is taken as unity at  $60^{\circ}$  F., as he began it should be represented by  $\cdot 7946$ ." This is pure assumption, and as we shall presently see is not correct, but to the author's mind the proposition is one capable of easy demonstration. A United States statute has established beyond controversy the true specific gravity of absolute alcohol. The following is the language of the statute: "Proof spirit shall be held and taken to be that alcoholic liquor which shall contain one-half its volume of alcohol of a specific gravity of  $\cdot 7939$  at  $60^{\circ}$  F. referred to water at its maximum density as unity." The statute is unfortunate in its wording, inasmuch as it does not specify at what temperature the liquid shall be measured, and it only implies that the "alcohol" described is an anhydrous spirit. The law defines what, legally, shall be called proof spirit; it does not fix the physical properties of the chemical compound, ethylic alcohol. That is something to be determined by actual observation: the law by which it was fixed is not written in any human statute book.

Dr. Squibb states that he has observed, repeatedly, in samples of absolute alcohol a specific gravity as low as  $\cdot 7934$  at  $60^{\circ}$  F., water at the same temperature being taken as standard. I do not find that any other observer confirms this statement; if it is true, none of our alcohol tables are quite correct, but that of Fownes, adopting the figure of Drinkwater ( $\cdot 79383$ ), is in this particular nearest to the truth. I have not been able to confirm Dr. Squibb's statement, but I have never been satisfied that alcohol was completely dehydrated until its specific gravity was reduced to  $\cdot 79385$  at  $60^{\circ}$  F., water at the same temperature being standard, and a spirit of that strength can easily be

obtained by carefully following out the ordinary plan of dehydrating by means of quick lime.

If this is true, the *tables* are fairly turned on Mr. Pile, for it is his table, and not that of Hehner, which (practically) adopts "two different values to denote the specific gravity of water as a standard, one at the beginning and another at the end." We hasten to explain, however, that such a change of standard does not, after all, seriously affect the figures in the important portions of the table, and further, that all the alcohol tables in common use, except that of Fownes-Hehner, are open to criticism of the same kind.

Mr. Pile seems to regard the standard of pure alcohol, like that of a unit of weight or measure, as something dependent on conventional or legal definition. He says "alcohol having a specific gravity of .8157 has been regarded as 95 per cent. alcohol for so long a time that it would seem to be difficult to interpret it in any other way, but by the adoption of the tables of Hehner it will have a specific gravity of .8161, and so on." And again, "why not compile tables having Tralles as a basis, and thus keep in harmony with law and custom?" This evidently, would make the scientific correctness of an alcoholometrical table of no importance, and its whole value conventional. We must here take issue with him, taking the ground that no conventions can alter mathematical relations, or properties inherent in chemical compounds. The object of tables such as these is to furnish not only a uniform, but also a correct basis for the valuation of alcoholic liquors in commercial transactions, and a scientific truth is the only ground on which the figures of such a table can be criticized.

The question, therefore, between Tralles and Fownes, between Pile and Hehner, is wholly one for the experimental physicist to decide. I have myself examined somewhat closely the subject, and am convinced, not on *a priori* grounds, but from crucial experiments, that Tralles is more nearly correct in the main in his figures than Fownes, and hence I am glad that Mr. Pile has expended so much careful labor in expanding them, since Hehner had previously done the same service for the less worthy table of Fownes. I only regret that he did not go quite to the root of the matter, and furnish us with an original table more correct than either.

Fownes' table was adopted some years ago by Dr. Squibb as a basis, in part, of his very elaborate and valuable alcohol tables. His figures were placed side by side in those tables with those of Tralles, with no

attempt to reconcile their differences, but with a manifest disposition on the part of the writer to accept Fownes as the more trustworthy authority. The internal evidence does not support this view. When we examine the table in comparison with the others in common use, we are at once struck with the lawless irregularity of its intervals. That there exists any corresponding irregularity in the amount of condensation which takes place when alcohol and water are mixed in varying proportions, we cannot believe. That such cannot be the case is indeed capable of mathematical demonstration. Fownes' table was based directly upon synthetical experiments, which are said to have been very carefully conducted. Every alternate term in the table is the result of a direct determination, the remaining terms being then supplied by interpolation. The table is, in fact, simply a collection of independent observations, each subject to its own error, whereas in a completed table the errors are made to correct and neutralize one another by a process of equalization of intervals. Hehner's task was only imperfectly done, in that he made no attempt thus to idealize the table which he adopted as a foundation for his own. We cannot but hope that the next revision of the Pharmacopœia will contain an ideal alcohol table, at once more concise and more comprehensive than the present, more nearly correct in all its values than any that has yet been published, and that it shall not need to be a mere echo of some foreign "authority."

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## SORGHUM SUGAR.

BY OSCAR HOUCK, PH.G.

*From an Inaugural Essay.*

The different kinds of sorghum (*Sorghum saccharatum*), now under cultivation in the United States, are varieties and hybrids from two main groups; the one the Chinese sugar cane, or sorgho, or sorghe, from China and India, and the second the African sugar cane, or imphee from the south of Africa. As varieties of the first group, we have the regular sorghum, Honduras cane, honey top, sprangle top, etc. Of the second group the most important are, the Liberian imphees, white African, white mammoth, Iowa red top and wolf's tail. As hybrids, the early amber is the most common, early orange and a number of others. These hybrids need, as also their names indicate, a

shorter time to attain maturity, and are therefore especially adapted for the more northern range, Wisconsin, Minnesota, etc., where the season is rather short; while the countries further south, with a longer season, have the advantage, that they can utilize both the early and late varieties, and thus be able to supply the mills for a longer time; besides that they also can utilize the other qualities, desirable in good cane, as saccharine richness, large percentage of juice, and large stalks. A rather sandy loam is said to be the most favorable soil for its cultivation.

The first seeds of the new sugar cane were brought to America in 1854, from France, where they had been imported from China only a few years previous. Not long afterwards also seeds of the African variety found their way over here. And now sorghum is to be found cultivated almost in all parts of the United States, where the climate is favorable to its growth; and it is said that where maize will thrive, sorghum also will.

Its principal use has, until lately, been confined to the mere production of syrup, as a very sweet, and to most persons, agreeable article of this kind may be prepared by means of quite inexpensive machinery. But the production of a cheap, marketable sugar from it, has, until the last three years, met with no success. Sugar has of course been produced from it long before this, but on account of inferior machinery and limited means it would not pay. It is also said that a fatty substance is contained in the juice of sorghum, which hindered the crystallization of the sugar, and necessitated another process than that used for the common sugar cane. The first sugar reported obtained from sorghum, was made by a farmer in Wisconsin (according to Prof. Carl Mohr). In 1858, J. S. Levering, a chemist of Philadelphia, received the gold medal from the United States Agricultural Society, as an acknowledgment for his successful and meritorious experiments in sugar making from sorghum ("Amer. Jour. Phar.," 1855, p. 182; 1858, p. 105). In spite of the publication of his process, no attempt was made to utilize it. Later, through the Commissioner of the Department of Agriculture at Washington, G. W. Le Due, a great deal was done in order to arouse the interest for it, that new experiments should be undertaken. Steward, a Pennsylvania chemist, also treated the subject, and showed at the Centennial Exhibition, in 1876, samples of sugar which he had obtained by his experiments. With still greater energy Dr. Collier, chemist of the



Agricultural Department at Washington, took up the work, and of the results of his thorough investigations, he has given a minute account in his several reports, which has thrown much light on the subject.

At the same time, Prof. Swenson, of the University of Wisconsin, was occupied with investigations of the same kind, and when the United States government, through the Agricultural Department at Washington, offered a prize of \$1,200 for the best method of treating sorghum cane, it was awarded to him.

Some New York capitalists, after having corresponded with Prof. Swenson and secured his service, determined to establish a sugar mill in some portion of the country, where the cane could be grown successfully and cheaply. The Arkansas river valley was decided upon, and in 1882 the mill was built at Hutchinson, Kansas. As an experiment some sugar was successfully made, already late, the same season. Last fall (1883), they made as an average 40 barrels of sugar and about 200 gallons of syrup a day. This was the first undertaking on a large scale, and as it proved a success, others have followed their example, and many more are likely to follow.

The process used in the above named mill I have not seen myself, but will give it as it has been described. The cane, having been examined by the chemist and found in the desirable ripe condition (when it contains most saccharose and least glucose), is cut, topped and hauled to the mill without stripping. Arrived there it is placed on a long endless belt, which acts as an elevator to carry it to the crusher, which consists of huge iron rollers. The cane is passed through this crusher at the rate of 25 tons per hour. The juice, as it runs from the rollers, passes into a large tank, from which it is pumped into the defecating room. Here it is run into six defecating pans, capable of holding three tons of juice each. In these are coils of copper tubing, through which steam is passed to heat the juice. To the lukewarm juice is then added milk of lime, until slightly alkaline, in order to neutralize the acids, which are always contained in it, and to coagulate the albuminous matter present. It is then heated as rapidly as possible to the boiling point, and the steam is shut off when the thick scum, which rises to the surface, begins to swell and break. After a few minutes the juice is skimmed, and it is again heated, this time to a quiet ebullition and again skimmed. This is repeated a few times, and the result is a very clear juice, almost free from sediment. From the defecating room the juice, containing 84 parts of water and 16 parts

of sugar, passes to the evaporating pans, where it is boiled down to 54 parts of water and 46 parts of sugar, when it is called "semi-syrup." This passes into a small vacuum pan, and from there into the bone-black filters. These are six in number, and are each cylindrical in shape, four feet in diameter and 20 feet high. Here the syrup is decolorized and deodorized, after which it is pumped into the large vacuum pan. This is ovoid in shape, made of boiler iron, and looks like a huge retort. It is seven feet in diameter, nine feet high, and will hold more than 1,000 gallons. In this the semi-syrup boils at 70° C. under diminished pressure, instead of 110° C. in free air. This is a great advantage, as it is a well-established fact that high heat and much exposure to the air quickens the conversion of saccharose into invert sugar. From the vacuum pan the syrup is put into large iron wagons, which hold about 250 gallons each, and in them is run into the crystallizing room. This room is kept at a temperature of 55° C., and in it the syrup is allowed to stand for several days until it crystallizes. The "melado," as the syrup at this stage is called, is then run into the mixer. This is a long bar with fingers attached, the whole revolving in an iron box. In this the melado is thoroughly mixed and made ready for the last process. From the mixer the melado is run into the centrifugals. These, four in number, are tubular vessels about three feet in length and two feet high, open above and closed below. Each is lined with fine copper sieve, a space of perhaps two or three inches intervening between the sieve and the outer wall of the centrifugal. The centrifugals are set in motion at the rate of 2,000 revolutions per minute, and the melado is run into them, falling upon a revolving disk in the centre. From this the melado is thrown with great force against the side of the vessel, striking upon the copper sieve, which is also in rapid revolution. The force of the projection throws the syrup through the sieve, while the crystallized sugar remains behind, whitening the longer it "spins," as the process is called. It is generally allowed to spin about fifteen minutes, after which the raw sugar is taken out and put into barrels, and the process is completed. Each centrifugal is capable of spinning 200 lbs. of sugar in those fifteen minutes. Besides these details, the process has, of course, its secrets, which are also kept as such.

From the above-named factory I obtained a sample of sugar, of which I made an analysis, which shortly will be explained. In appearance the sugar looks very much like the common raw sugar of com-

merce. But in odor and taste it differs somewhat, as it has retained some of that peculiar sorghum flavor, which is not disagreeable, and in which place in common raw sugar is found a taste and smell of burnt sugar.

In my analysis of the sorghum sugar I found the following constituents :

Saccharose.....	92.00 per cent.
Glucose.....	4.50 per cent.
Moisture.....	1.50 per cent.
Ash.....	1.10 per cent.
Impurities.....	0.90 per cent.
	<hr/>
	100.00

The amount of saccharose was ascertained by the use of the Wilde polariscope, which as an average showed 92°. With the same instrument I examined samples of different sugars with the following results (The strength of the solutions was 10 grammes of sugar and water sufficient to make 100 cc.):

White rock candy polarized.....	100°
Yellow rock candy polarized.....	93°
Best granulated sugar polarized.....	99°
White A sugar polarized.....	94°
Common raw sugar polarized.....	84°
Sorghum sugar (4 experiments).....	90°, 92°, 93°, 92°

Common raw sugar was also subjected to analysis for comparison :

Saccharose.....	84.00 per cent.
Glucose.....	11.50 per cent.
Moisture.....	2.50 per cent.
Ash.....	0.70 per cent.
Impurities.....	1.00 per cent.
	<hr/>
	100.00

The moisture and ash of granulated sugar was also ascertained and found to be respectively 0.55 and 0.44 per cent. This shows in reference to the moisture, that the more glucose contained in the sugar, the more moisture is absorbed. As to the sorghum sugar the comparison is very satisfactory, as it contains eight per cent. more saccharose than the common raw sugar, and only two per cent. less than the A sugar, which has gone through a refining process. This very satisfactory result is due to the improved machinery of which the vacuum pan and the centrifugals are the most important, and without which the idea of sugar making, from sorghum, at the present sugar prices, might be given up as almost hopeless. But as it is, sorghum sugar can compete with other sugars, both in price and quality.

## THE ALKALOIDS OF COPTIS TRIFOLIA.<sup>1</sup>

BY JOHN J. SCHULTZ.

*A Thesis Presented to the Cincinnati College of Pharmacy, Session 1883-84.*

To find the proportion of alkaloids in *Coptis trifolia*, five pounds of carefully selected *coptis*, in moderately coarse powder, were moistened with officinal alcohol and packed firmly in a properly prepared cylindrical percolator. Officinal alcohol was then added in successive portions of two gallons each. The last portion was acidulated with four ounces of acetic acid. After each addition, maceration was conducted for twenty-four hours, and percolation was continued until the percolate finally passed almost colorless and devoid of any bitter taste.

Five gallons and five pints of percolate of a yellowish brown color and decidedly bitter taste were obtained. The dregs after having been removed from the percolator and dried at a temperature of 110°F., weighed four pounds and eight ounces, showing a loss of eight ounces.

To four and one-half pints of this percolate, representing eight ounces of drug, an excess of sulphuric acid was added and the mixture set aside in a cool place.

To one pint and two ounces of percolate, representing two ounces of drug, an excess of hydrochloric acid was added and the mixture set aside with the foregoing.

After standing forty-eight hours a preeipitate had formed in each, that of the sulphuric acid being light yellow, while that of the hydrochloric acid was yellowish brown.

The supernatant liquids in each case were bitter and retained a decided yellow color, characteristic of berberine, showing that the precipitation of the berberine had been incomplete.

Two pints and four ounces of the original percolate, representing four ounces of drug, were then subjected to distillation, until the residue was of a syrupy consistence. The retort was then rinsed with eight ounces of water, the result placed in an evaporating dish, and the last traces of alcohol vaporized. A dark greenish fixed oil and a

<sup>1</sup> These experiments were carried on in the laboratory of Professor J. U. Lloyd, upon authentic specimens furnished by him. We take this opportunity to thank him for the attention shown us.



lighter colored resin began to separate as the alcohol evaporated, and these were completely precipitated by allowing the liquid to stand in a cool place for twenty-four hours. The contents of the dish were then thoroughly agitated with water and filtered. The filtrate was now evaporated to a syrupy consistence and eight ounces of alcohol added. This was divided into two equal portions, and one was strongly acidulated with sulphuric, the other with hydrochloric acid, and both set aside in a cool place.

After standing twenty-four hours, the portion acidulated with sulphuric acid had formed a considerable amount of a brownish yellow precipitate, but the supernatant liquid was still bitter and retained its yellow color. The portion acidulated with hydrochloric acid showed only a slight cloudiness, and did not precipitate even after standing for two weeks.

The foregoing processes are the ones usually employed for the separation of berberine, and neither, in these instances, gave a satisfactory result.

Through the courtesy of Professor J. U. Lloyd, we were enabled next to employ his scheme for the determination of berberine, as stated in the manuscript of his work upon "Drugs and Medicines of North America," and which is based upon the insolubility of pierate of berberine in most menstruums.

The first step was to separate the second alkaloid, discovered by Mr. E. Z. Gross, as follows: Of the remainder of the percolate, four gallons and one pint, representing four pounds of drug, were subjected to distillation, and the oil and resin separated in the manner heretofore described. To the resulting filtrate, officinal water of ammonia was added until slightly in excess. This produced a dark brown flocculent precipitate, which was collected on a filter and thoroughly washed with water. The filtrate, after having been slightly acidulated with sulphuric acid, and allowed to stand for several hours, was brought to an alkaline reaction by the addition of water of ammonia, when a second precipitation took place similar in appearance to the first. This and the foregoing precipitate after having been mixed and dried spontaneously, was treated with successive portions of chloroform. The chloroform was then distilled, and the residue exhausted with dilute sulphuric acid. The resulting solution when filtered and made alkaline by addition of ammonia water, gave a precipitate which when dried spontaneously, weighed 3.42 grains.

A portion of this precipitate when dissolved in water acidulated with acetic acid, gave precipitates with the following reagents for alkaloids: Platinic chloride, molybdate of ammonium, solution of iodine in iodide of potassium, and test solution of iodide of mercury and potassium.

A chloroformic solution of the remainder of this precipitate when evaporated on a slide formed microscopic crystals, but the quantity obtained was too small to admit of further investigation. (This was the second alkaloid as found by Mr. Gross.)

To a portion of the filtrate, from the foregoing precipitates, solution of carbonate of sodium was added without producing any precipitate, and it was positively shown that there was no more of this second alkaloid present.

To the entire filtrate and washings thus obtained from the second alkaloid, and which were of alkaline reaction, a solution of carbazotate of ammonium was now added. This produced a bulky yellow precipitate of carbazotate of berberine, which when collected on a filter and dried spontaneously, weighed 292·8 grains, corresponding to 228·03 grains of sulphate of berberine.

In order to test the filtrate for any remaining alkaloids, a portion was evaporated nearly to dryness on a water bath, and agitated successively with ether, chloroform, benzol and carbon disulphide.

The several solutions were evaporated, the residue dissolved in water and portions of it separately tested with test solution of iodide of mercury and potassium, molybdate of ammonium, and chloride of platinum, without producing any precipitate, thus showing the previous complete separation of all the alkaloids.

*Recapitulation.*—The foregoing experiments show, that *Coptis trifolia* yields to officinal alcohol, slightly acidulated with acetic acid, 10 per cent. of its weight of extractive matter. That it contains two alkaloids, as previously shown by the investigations of Mr. E. Z. Gross ("Am. Jour. Pharm.," 1873). That the berberine of *Coptis trifolia* is only partially separated by the processes usually employed for the determination of berberine. That it contains of berberine an amount equivalent to 0·8 per cent. of sulphate of berberine, or 57 grains of sulphate of berberine to the avoirdupois pound. That the amount of the second alkaloid is very small, 0·012 per cent., or only 0·855 grain to the avoirdupois pound having been obtained.

## OLEUM GAULTHERIÆ.

BY ISAAC EDWARD LEONARD, PH.G.

*Abstract from a Thesis.*

Oil of wintergreen was first made in Luzerne county, Pa., in 1863, from which time it has been distilled in great quantities, with the exception of last year, when the yield was not so plentiful, owing to the destruction of the shrubberies by the fire which passed over our mountains.

In distilling, the entire overground portion of the plant is employed, which has its greatest yield during the months of July and August.

The still is generally a wooden box, about eight feet long, four feet wide, four feet high, with a copper bottom and staid with bolts. The head of the still is copper, and connecting with this is a square or circular worm of the same material or of tin, placed in a barrel. The still being filled with wintergreen to within about twelve inches of the top, a sufficient quantity of water is added, and this is allowed to macerate from ten to twelve hours. The fire being started, the distillation commences and continues for about eight hours; but during the first two or three hours, ninety per cent. of the oil has passed over. For collecting the distillate, most of the stillers use a wide mouth bottle or fruit jar, fitted with a large cork having two holes. A small tin or glass funnel is put into one of the holes, so that the beak of the funnel is below the shoulder of the receiving vessel, and connected with the other hole is a suitable pipe forming an egress. The distillate passes into the receiving vessel through the funnel. It is here that the oil and the water separates, the oil going to the bottom, and the water being lighter and in excess passes through the egress pipe into a larger receptacle, where it is reserved for a subsequent operation (cohobation).

Occasionally the oil is very highly colored. I have found several samples to contain traces of iron, which is due to the oxidation of the tin worm or can with which the oil comes in contact. Tin worms are used on account of their cheapness, but will only last about two weeks, before they undergo oxidation.

The wholesale dealers that handle the oil in large quantities have three ways of "cleaning" it, re-distillation, filtration, and decolorization. The first two processes are easily understood, while the decolor-

ization seems a difficult one, but is much easier than either of the others. The oil to be decolorized is put into a bottle and crystals of citric acid are added, the whole allowed to stand, agitating occasionally, until the oil is colorless, or nearly so.

On experimenting with nine quarts of wintergreen fruit, I found it contained one and one-half drachms of oil. The chief uses of the oil, are for flavoring and in printing fine calicoes.

In experimental distillation, I found that the lower specific gravity is due to the separating of the oil from the water too quickly, and that the higher specific gravity is obtained by letting the distillate stand from twenty-four to forty-eight hours before separating the oil from the water.

A case of poisoning occurred in 1883, at one of the grocery stores in White Haven, Pa. A man mistaking the oil for the milky water, drank about two ounces; he was taken to his home in Easton, Pa., and died in about five hours.

Parties have tried to export the oil, but did not succeed.

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## ON THE COMPOSITION OF OIL OF GAULTHERIA.

BY HARLAN P. PETTIGREW, PH.G.

*From an Inaugural Essay.*

The author gives a brief account of the investigations made by Prof. Procter on the oil of sweet birch ("Amer. Jour. Phar.," xv, p. 241), and of the information furnished by G. W. Kennedy (Ibid., 1882, p. 49), regarding its manufacture on a large scale and its sale in place of oil of gaultheria; and he refers to his chemical investigation of this oil (Ibid., 1883, p. 385) which showed it to be methyl salicylate. The first experiments on the chemical composition were made by Procter (Ibid., xiv, 211); afterward a fuller chemical investigation was made by Cahours (Ibid., xv, 241, from "Jour. de Phar. et de Chim.," May, 1843). To the latter is generally attributed the statement that this oil contains 10 per cent. of terpene; but in the French journal named no mention is made of a terpene, and the presence even of methyl alcohol was not conclusively proved, as the following abstract from that paper shows: "On treating this oil with a solution of potassa of 45°B., to which fragments of that alkali were added, and submitting the mixture to a regulated heat and distilling, a distillate was obtained



in the receiver which, after being treated several times with lime, furnished a liquid more volatile than water, and burning with a pale blue flame." The original papers on Salicylic Compounds, published by Cahours in "*Annales de Chimie et de Physique*" and in "*Comptes Rendus*," could not be consulted.

Two different specimens of oil of gaultheria were examined by the writer; one was obtained by Prof. Maisch, from Messrs. Underhill, Concord, N. H., and was distilled by them; the other was obtained directly from a distiller in Ellenville, N. Y., and both were guaranteed to be absolutely pure. These oils, when received, had already acquired a very slight reddish tinge, but upon re-distillation were obtained as bright, colorless and quite highly refractive liquids, having the specific gravity 1.17, both corresponding in this respect with the specific gravity of oil of wintergreen as determined by Procter.

The oils were treated separately, 190 grams being operated upon in each case. The plan followed in the investigation of this oil was the same as that adopted in the analysis of the oil of birch ("*Amer. Jour. Phar.*," 1883, p. 385), namely, saponification by treatment with a concentrated solution of potassium hydrate and boiling over a sand bath in a flask fitted with an inverted condenser. After complete decomposition of the oil, the contents of the flask were submitted to distillation upon a sand bath until the residue remaining in the flask was nearly dry. The distillate thus obtained presented a milky appearance, and globules of a yellowish oily substance were seen floating upon the surface. This is one striking difference between this oil and the oil of birch, as the corresponding distillate obtained from the latter was perfectly clear and transparent. The distillate was then agitated in the flask in which it was collected, with several successive portions of ether, and the ethereal solutions were carefully separated from the aqueous liquid, and the ether recovered by distillation upon a water bath. The residue remaining in the flask then consisted (besides a few drops of water) of a yellowish oily substance, which was lighter than water and possessed a very strong peculiar odor entirely different from that of the oil of birch or wintergreen. The terpene was then weighed without any attempt being made to purify it, as the amount was small. This determination was only approximate, yet the amount of terpene found amounted to but 0.3 per cent. of the weight of the oil.

The aqueous liquid which remained after extracting the terpene by agitation with ether, and which contained the methyl alcohol, was per-

fectly clear and transparent, and the alcohol, which was obtained by repeated distillation of the liquid from a water bath, collecting only the lighter portions which passed over first, and further rectifying these by distilling from caustic lime, possessed the same odor, and was of the same specific gravity and boiling point as methyl alcohol.

The salicylic acid was obtained by making an aqueous solution of the salicylate of potassium, which remained in the flask after the first distillation, and decomposing this by the addition of a slight excess of hydrochloric acid, the chloride of potassium formed remaining in solution, while the salicylic acid formed as a dense white precipitate which, after washing with water and drying, was obtained pure by crystallizing from hot petroleum benzin.

Both specimens of oil examined yielded about the same amount of terpene, but as a portion of one of them was accidentally lost, no attempt was made to weigh the small amount remaining.

These results show that oil of gaultheria sp. gr. 1.17 does not contain 10 per cent. of a terpene; for, if it did, the specific gravity of the oil would necessarily be very much lower than that of the oil of birch, in which the absence of a terpene has been conclusively proved.

Whether the oil of gaultheria which has been distilled in the spring or summer contains more of the terpene than that distilled in the fall, is not known; but from results obtained by experiments made upon a specimen which was distilled in the spring, it seems that there is a difference, as this oil was found to have a specific gravity of but 1.0318, and the absence of alcohol was shown upon application of several of the tests for that substance.

After referring to Mr. Kennedy's paper read before the American Pharmaceutical Association (see "Amer. Jour. Phar.," 1883, p. 533; also 1883, p. 85), the writer continues: According to information upon this subject, obtained from a distiller of oil of gaultheria, the oil, which is seen floating in small globules upon the water will, if allowed to stand 24 hours, all collect together into large drops, and settle to the bottom of the containing vessel. This alone shows that this oil cannot consist of a hydrocarbon, but to decide the question conclusively, a small amount of water, which was taken from the receiver just as it came over from the still, was agitated with several successive portions of ether, the ethereal solutions being carefully separated from the water, were evaporated, whereby only a very small amount of oil was obtained, which did not possess any odor of the terpene, and which con-

sisted only of the pure oil of gaultheria. This shows that the terpene does not become separated in the process of distillation.

The results of these investigations may be briefly summarized as follows :

I. Oil of birch is not identical with oil of gaultheria, in that it consists entirely of salicylate of methyl, and contains no terpene.

II. Oil of gaultheria, sp. gr. 1.17, does not contain ten per cent., but only a very small amount, of terpene, to the presence of which is due the slight difference in odor and specific gravity between the two oils.

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### SALICYLIC ACID AS A FOOD PRESERVATIVE.

Prof. Brouardel has recently published the conclusions of the Comité Consultatif d'Hygiène Publique on this subject.

He observes that, although the beneficial operation of salicylic acid in certain diseases is fully admitted, the theory of its action is very imperfectly understood. It is known, however, that when introduced into the economy it is eliminated by the kidneys and liver; and its warmest partisans admit that its use is contraindicated in the subjects of those diseases, which prevent its due elimination, and thus give rise to an accumulation that in several instances has proved fatal. Moreover, elimination is sometimes impeded from unknown causes in persons in whom the functions of these organs work healthily; while in aged persons it is always very slow. Under any circumstances, only a portion of the salicylic acid is eliminated, the remainder undergoing combinations in the tissues, which, although they may prove therapeutically useful, and even for a time produce no evil consequences, could not be indefinitely prolonged without mischief ensuing.

Even small doses of the salicylate may prove dangerous to persons who eliminate it imperfectly; and Prof. Brouardel's investigations during several years past lead him to believe that the number of such persons is largely on the increase. Since 1861 he has analyzed the urine of all patients entering his hospital service, and his registers show that the frequency of albuminuria has more than doubled during the last twenty years. Now, these patients are not all condemned to an early death, for many recover, and others live for many years; and when examples are adduced of young and robust persons tolerating the daily use of from four to six grammes of the salicylates for months

or years, we must not forget the aged persons and albuminurics, and individuals the subjects of various kinds of hepatic and renal disease, whose lives might be seriously compromised by such a regimen. The committee, therefore, believing that for such persons the daily use of salicylic acid would be highly dangerous, while even for those in good health there is no proof that it would be innocuous, recommend that its present prohibition should be maintained.—*Medical Times and Gazette*, Feb. 16, 1884; *Amer. Jour. Med. Sciences*, April.

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### TIN IN CANNED FOODS.<sup>1</sup>

BY PROFESSOR ATTFIELD, F.R.S., ETC.

From time to time, during the past twelve years, paragraphs have appeared in newspapers and other periodicals tending in effect to warn the public at least against the indiscriminate use of canned foods. And whenever there has been any foundation in fact for such cautions, it has commonly rested on the alleged presence and harmfulness of tin in the food. At the worst the amount of tin present has been absurdly small, affording an opportunity for one literary representative of medicine to state that before a man could be seriously affected by the tin, even if it occurred in the form of a compound of the metal, he would have to consume at a meal ten pounds of the food containing the largest amount of tin ever detected.

But the greatest proportions of tin thus referred to are, according to my experiments, far beyond those ever likely to be actually present in the food itself in the form of a compound of tin; present, that is to say, on account of the action of the fluids or juices of the food on the tin of the can. Such action and such consequent solution of the tin, and consequent admixture of a possibly assimilable compound of tin with the food, in my opinion, never occurs to an extent which in relation to health has any significance whatever. The occurrence of tin, not as a compound, but as the metal itself, is, if possible, still less important.

During the last fifteen years I have frequently examined canned foods, not only with respect to the food itself as food, and to the process of canning, but with regard to the relation of the food to, or the influence if any of the metal of, the can itself. So lately as within

<sup>1</sup> Read at an Evening Meeting of the Pharmaceutical Society, March 5th, 1884.



the past two or three months I have examined sixteen varieties of canned food for metals, with the following results:

Name of article examined.	Decimal parts of a grain of tin (or other foreign metal) present in a quarter of a pound.
Salmon .....	none
Lobsters.....	none
Oysters.....	0.004
Sardines.....	none
Lobster paste.....	none
Salmon paste.....	none
Bloater paste .....	0.002
Potted beef.....	none
Potted tongue.....	none
Potted "strasbourg".....	none
Potted ham.....	0.002
Luncheon tongue.....	0.003
Apricots.....	0.007
Pears.....	0.003
Tomatoes.....	0.007
Peaches .....	0.004

These proportions of metal are, I say, undeserving of serious notice. I question whether they represent more than the amounts of tin we periodically wear off tin saucepans in preparing food—a month ago I found a trace of tin in water which had been boiled in a tin kettle—or the silver we wear off our forks and spoons. There can be little doubt that we annually pass through our systems a sensible amount of such metals, metallic compounds, and other substances that do not come under the denomination of food; but there is no evidence that they ever did or are ever likely to do harm or occasion us the slightest inconvenience. Harm is far more likely to come to us from noxious gases in the air we breathe than from foreign substances in the food we eat.

But whence come the much less minute amounts of tin—still harmless be it remembered—which have been stated to be occasionally present in canned foods? They come from the minute particles of metal chipped off from the tin sheets in the operations of cutting, bending or hammering the parts of the can, or possibly melted off in the operations necessary for the soldering together of the joints of the can. Some may, perhaps, be cut off by the knife in opening a can. At all events I not unfrequently find such minute particles of metal on care-

fully washing the external surfaces of a mass of meat just removed from a can, or on otherwise properly treating canned food with the object of detecting such particles. The published processes for the detection of tin in canned food will not reveal more than the amounts stated in the table, or about those amounts, that is to say, a few thousandths, or perhaps two or three hundredths of a grain, if this precaution be adopted. If such care be not observed the less minute amounts may be found. I did not detect any metallic particles in the twelve samples of canned food just mentioned, but during the past few years I have occasionally found small pieces of metal, perhaps amounting in some of the cases to a few tenths of a grain per pound. Now and then small shot-like pieces of tin, or possibly solder, may be met with. But no one has ever found, to my knowledge, such a quantity of actual metallic tin, tinned iron, or solder, as, from the point of view of health, can have any significance whatever.

The largest amount of tin I ever detected in actual solution in food was in some canned soup, containing a good deal of lemon juice. It amounted to only three-hundredths of a grain in a half pint of the soup as sent to table. Now, Christison says that quantities of 18 to 44 grains of the very soluble chloride of tin were required to kill dogs in from one to four days. Orfila says that several persons on one occasion dressed their dinner with chloride of tin, mistaking it for salt. One person would thus take not less than 20 to 30 grains of this soluble compound of tin. Yet only a little gastric and bowel disturbance followed, and from this all recovered in a few days. Pereira says that the dose of chloride of tin as an antispasmodic and stimulant is from  $\frac{1}{16}$  to  $\frac{1}{2}$  a grain repeated two or three times daily. Probably no article of canned food, not even the most acid fruit, if in a condition in which it can be eaten, has ever contained, in an ordinary table portion, as much of a soluble salt of tin as would amount to a harmless or useful medicinal dose.

Metallic particles of tin are without any effect on man. A thousand times the quantity ever found in a can of tinned food would do no harm.

Food as acid as, say ordinary pickles, would dissolve tin. Some manufacturers once purposed using tin stoppers to their bottles of pickles. But the tin was slowly dissolved by the acid of the vinegar. These pickles, however, had a distinctly nasty "metallic" flavor. The idea was abandoned. Probably any article of food containing enough

tin to disagree with the system would be too nasty to eat. Purchasers of food may rest assured that the action taken by this firm would be that usually followed. It is not to the interest of manufacturers or other vendors to offend the senses of purchasers, still less to do them actual harm; even if no higher motive comes into force.

In the early days of canning, it is just possible that the use of "spirits of salt" in soldering may have resulted in the presence of a little stannous, plumbous, or other chloride in canned food; but such a fault would soon be detected and corrected, and, as a matter of fact, rosin-soldering is to my knowledge more generally employed—indeed, for anything I know to the contrary, is exclusively employed—in canning food. Any rosin that gained access would be perfectly harmless. It is just possible, also, that formerly the tin itself may have contained lead, but I have not found any lead in the sheet tin used for canning of late years.

In conclusion: 1. I have never been able to satisfy myself that a can of ordinary tinned food contains even a useful medicinal dose of such a true soluble *compound* of tin as is likely to have any effect on man. 2. As for the metal itself, that is the filings or actual metallic particles or fragments, one ounce is a common dose as a vermifuge; harmless even in that quantity to man, and not always so harmful as could be desired to the parasites for whose disestablishment it is administered. One ounce might be contained in about four hundred-weight of canned food. 3. If a possibly harmful quantity of a soluble compound of tin be placed in a portion of canned food, the latter will be so nasty and so unlike any ordinary nasty flavor, so "metallic," in fact, that no sane person will eat it. 4. Respecting the globules of solder (lead and tin) that are occasionally met with in canned food, I believe most persons detect them in the mouth and remove them, as they would shots in game. But if swallowed they do no harm. Pereira says that metallic lead is probably inert, and that nearly a quarter of a pound has been administered to a dog without any obvious effects. He goes on to say that as it becomes oxidized it occasionally acquires activity, quoting Paulini's statement that colic was produced in a patient who had swallowed a leaden bullet. To allay alarm in the minds of those who fear they might swallow pellets of solder, I may add that Pereira cites Proust for the assurance that an alloy of tin and lead is less easily oxidized than pure lead. 5. Unsoundness in meat does not appear to promote the corrosion or solution of tin. I have

kept salmon in cans till it was putrid, testing it occasionally for tin. No trace of tin was detected. Nevertheless, food should not be allowed to remain for a few days, or even hours, in saucepans, metal baking pans, or opened tins or cans, otherwise it *may* taste metallic. 6. Unsound food, canned or uncanned, may of course injure health, and where canned food really has done harm, the harm has in all probability been due to the food and not to the can. 7. What has been termed idiosyncrasy must also be borne in mind. I know a man to whom oatmeal is a poison. Some people cannot eat lobsters, either fresh or tinned. Serious results have followed the eating of not only oatmeal or shell-fish, but salmon and mutton; *hydrate* (misreported *nitrate*) of tin being gratuitously suggested as being contained in the salmon, in one case. Possibly there were cases of idiosyncrasy in the eater, possibly the food was unsound, possibly other causes altogether led to the results, but certainly, to my mind, the tin had nothing whatever to do with the matter.

In my opinion, given after well weighing all evidence hitherto forthcoming, the public have not the faintest cause for alarm respecting the occurrence of tin, lead, or any other metal in canned foods.—*Phar. Jour. and Trans.*, March 8th, 1884, p. 719.

## SAPONIN FROM SAPONARIA OFFICINALIS.

BY C. SCHIAPARELLI.

The analyses hitherto made of saponin obtained from different plants are not very concordant, the results varying indeed from 47.52 per cent. C. and 7.16 H. (Overbeck) to 52.63 C. and 7.48 H. (Rochleder and Schwarz). Moreover the experiments of the last-named chemist lead to the conclusion that the carbohydrate obtained in the first instance from saponin by decomposition with acids, is not grape-sugar, but a body convertible into that sugar by the further action of acids,—and consequently that saponin is not a glucoside but an amyloid. To throw further light on this matter, the author has endeavored to determine whether the products extracted from different plants and included under the name of saponin, are really identical, and in the present paper he describes the results obtained with saponin from *Saponaria officinalis*.

The root of this plant, dried and coarsely pounded, was boiled for three days in a reflux apparatus with alcohol of 90°; after which the boiling alcoholic decoction was separated and left for some days in a



cool place, whereupon the sides of the vessel became coated with a copious yellow flocculent deposit which, when freed from coloring matter by treatment with a warm mixture of alcohol and ether, consisted of saponin, still, however, very impure. Treatment with alcohol and animal charcoal still left it contaminated with about 3 per cent. of mineral matter. It was, therefore dissolved in the smallest possible quantity of water; the cold solution was precipitated with saturated baryta-water; the resulting barium saponate, after washing with baryta-water, was suspended in water and decomposed by a current of carbonic anhydride, then heated to the boiling point, and filtered; the filtrate evaporated to a syrup at a gentle heat was precipitated with alcohol; and the still yellowish saponin was further purified with alcohol of 90 per cent. The substance thus obtained still contained barium salts, to remove which it was dissolved in water and treated with dilute sulphuric acid, added drop by drop; and the filtered liquid, after concentration at a gentle heat, was precipitated with alcohol and ether, these operations being repeated a second and a third time, and the product finally purified with boiling alcohol of 90 per cent. in quantity not sufficient to dissolve it completely. The alcoholic solution evaporated in a vacuum left perfectly white flocks of pure saponin, which were washed with ether and dried over sulphuric acid.

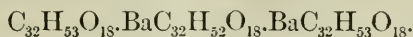
Saponin thus prepared gave, as the mean result of five analyses 52.65 per cent. carbon and 7.36 hydrogen, agreeing nearly with the formula  $C_{32}H_{54}O_{13}$ , which requires 52.86 C. and 7.44 H. Saponin from *Gypsophila* was found by Rochleder to contain 52.65 carbon and 7.34 hydrogen.

Pure saponin is a very white amorphous inodorous powder, which excites sneezing when inhaled by the nostrils; it has a pungent disagreeable taste, and is poisonous; dissolves very freely in water, but is insoluble in ether, benzene, and chloroform, and only slightly soluble in alcohol. Heated on platinum foil, it decomposes, emitting an odor of burnt sugar, and leaving a porous residue difficult to burn. Saponin is levogyrate, like most glucosides; specific rotatory power  $[\alpha]_D = -7.30$ ; it is the least optically active of all known glucosides.

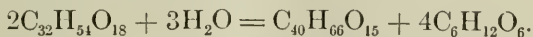
Saponin, as already observed, is remarkable for the power of its aqueous solution to dissolve salts which are insoluble in water. When its aqueous solution, mixed with lead acetate, is precipitated by hydrogen sulphide and filtered the liquid which passes through is black from dissolved lead sulphide, which may be precipitated from it by adding

a small quantity of alcohol. A boiling aqueous solution of saponin dissolves barium carbonate (up to 10 per cent.), which may be precipitated by sulphuric acid; nevertheless barium sulphate is slightly soluble in aqueous saponin. This property of dissolving salts throws great difficulty, as already observed, in the way of purifying saponin. This substance likewise dissolves gases and incloses them mechanically. A dilute aqueous solution of saponin forms on agitation a very persistent froth.

An aqueous solution of saponin mixed with hydroxide of potassium, barium, or strontium, yields precipitates of the corresponding compounds. The barium compound has the composition—



*Products of Decomposition of Saponin.*—An aqueous solution of saponin was heated on a water-bath with dilute sulphuric or hydrochloric acid, the liquid being filtered after two hours, in order to remove the flocculent substance which separated, and thereby prevent its further decomposition by the acid; the filtered solution was then again boiled, the new precipitate separated, and these operations were repeated a third time. The three precipitates thus obtained agreed very closely in composition, giving as the mean result of their analysis, 60.65 per cent. carbon and 8.22 hydrogen, numbers agreeing nearly with the formula  $\text{C}_{40}\text{H}_{66}\text{O}_{15}$ , which requires 61.06 carbon, 8.38 hydrogen, and 3.56 oxygen. The decomposition of saponin by dilute acids may therefore be represented by the equation



The compound  $\text{C}_{40}\text{H}_{66}\text{O}_{15}$  is called by the author saponetin, to distinguish it from the *sapogenin* of Rochleder and others, which was not of constant composition. Saponetin is a whitish microcrystalline substance, insoluble in water, alcohol, and ether,

The glucose formed by the action of dilute acids on saponin is dextrogyrate, its specific rotatory power being  $[\alpha]_b = +52.48$ . It is fermentable, has a saccharine taste, and has not yet been crystallized, its solution, after concentration to a syrup, having remained for six months without giving any sign of crystallization. Further experiments are, however, required to determine whether it is a peculiar sugar distinct from dextrose, or whether the difference between its optical rotatory power and that of the latter is due to some other cause.

—*Gazzetta*, xiii., 422–430; *Jour. Chem. Soc.*, March, 1884, p. 332.

## SAPONIN FROM QUILLAIA.

By E. STÜTZ.

At the commencement of this paper, an historical account is given of saponin, a drug obtained from the *Saponaria rubra* and its allied species. The formulæ proposed for this substance, deduced from the percentage proportions of carbon and hydrogen found in it, are various, but most experimenters are agreed in proving that it is decomposed on boiling with acids, yielding a carbohydrate among other products.

The source of the saponin studied in this paper was the bark of the *Quillaja Saponaria*, a member of the Spireæa family, indigenous in Chili and Peru. This was digested with water, the extract evaporated down, and hot alcohol of 90 per cent. added; on cooling, white flocks of saponin separated, which were then frequently recrystallized from alcohol, and finally purified by animal charcoal.

Saponin thus obtained is a white, amorphous, neutral powder, generally possessing an astringent taste, due to traces of impurities; it is soluble in water, insoluble in absolute alcohol and ether; its aqueous solution forms a lather like soap. When heated to 195° it turns brown, and at a higher temperature evolves a vapor resembling caramel in odor.

The author was unable to obtain saponin free from inorganic impurities; and from the proportion of its barium compound it would appear probable that the impurities, principally consisting of calcium, were intimately associated with the saponin. From the mean of four concordant analyses the formula  $C_{19}H_{30}O_{10}$  is deduced.

A concentrated aqueous solution of saponin is precipitated by baryta-water; a substance of composition  $2C_{19}H_{30}O_{10} + Ba(OH)_2$  being formed, from which the barium is not readily separated by carbonic anhydride. In order to determine the number of alcoholic hydroxyl groupings present in saponin, it was heated with acetic or butyric anhydride under various conditions. A series of acetyl derivatives was thus obtained; amongst which are enumerated a tetracetyl,  $C_{19}H_{26}\overline{Ac}_4O_{10}$ , and a pentacetyl,  $C_{19}H_{25}\overline{Ac}_5O_{10}$ , derivative, and two compounds formed by the addition of acetic anhydride to the latter substances, viz.,  $C_{19}H_{25}\overline{Ac}_5O_9(O\overline{Ac})_2$ , and  $C_{19}H_{25}\overline{Ac}_5O_8(O\overline{Ac})_4$ . From these results it follows that the saponin contains five hydroxyl groups, and two oxy-

gen atoms combined only with carbon; its constitutional formula will thus be:  $C_{19}H_{25}(OH)_5.O_2.O_3$ . From the acetyl derivatives saponin can be regenerated.—*Jour. Chem. Soc.*, April, 1884, p. 463, from *Annalen*, vol. 218.

## ACONITE ROOT.

By E. R. Squinn, M.D.

The description of the Pharmacopœia applies very well indeed to some parcels of Aconite root, but there are few drugs which, while retaining a general form, vary more in size, color and thickness of bark, in different parcels met with in the markets. The roots in the same parcel vary very much also in size, surface, and internal structure. Many roots in every parcel will not be over 1 to  $1\frac{1}{2}$  inches in length, and while a large proportion are very much wrinkled longitudinally, a few are quite smooth. These smooth roots are absent entirely from some parcels, and are not very numerous in any. They break with a solid, starchy fracture, and commonly have a very thin bark. The wrinkled roots are more spongy internally, and some are very light and porous, doubtless from having been in a very succulent condition when gathered. All these varieties may be very strong or very feeble to the taste, for the appearance bears very little relation to the activity of the root. Some parcels are much more stalky than others; that is, have more of the comparatively inert stalk cut off with the root, and in this are of course objectionable, yet many parcels that are quite stalky are to be preferred to those which are better trimmed, on account of superior activity. The greatest difference, however, in different bales is in the taste, or rather in the aconite impression upon the tongue and lips, and upon this the writer has long relied in selecting for purchase. Some years ago he published the method of testing by taste, and at that time stated that, with care in selection, parcels could be had which when each root of a handful sample was broken in the middle, and a very small piece from the point of fracture was chewed between the front teeth in contact with the tip of the tongue for a few moments, and was then discharged, eight out of ten of the roots would give the characteristic aconite tingling in some degree within ten or fifteen minutes. He can now state that parcels are easily had, though at a higher price, every root of which will give a strong sensation from a very small particle. This has made him revise the test within the past two years. As it comes from shipboard, or from storehouses, it



is commonly tough enough to be cut across with a sharp knife without going to dust as it does when dry. A very thin slice cut across from the middle of the root will weigh about a centigramme, or a little over one-sixth of a grain. This, if cut in ten pieces of nearly equal size, each will weigh about a milligramme, or the sixty-fifth of a grain. One of such pieces, taken between the front teeth and chewed in contact with the tip of the tongue with saliva enough to wet it, for about one minute, should give the aconite impression, not strongly, and not amounting to tingling, but yet a distinct impression which, when realized a few times, will always be recognized. There is no need of this cutting and weighing more than once, and that only to see how small a piece to take for the test, and there is a great advantage in taking so very small a piece, because the impression from it is so faint that it soon passes away, and admits of another root being tested in the same way in half an hour or so. If the piece be larger and the impression strong, it will last for two hours or more, and thus only a very few pieces can be tested in a day. At best it is a slow process, but well worth applying in the interest of accurate medication by a drug so important. Few pharmacists or physicians ever see the root, but only get the powdered root. The powder should be tested in the same way, taking about the same quantity on the tip of the tongue, and bruising and softening it with the teeth so as to get out the active principle.

Aconite root is not sweetish as described by the Pharmacopœia but is distinctly bitterish, but the taste proper is always faint. Some roots are tasteless, or so nearly so that no very distinct taste is recognized, and yet such roots may in a few minutes give a very decided impression.—*Ephemeris*, March, 1884, p. 502.

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**Artificial Food for Children.**—There has been great discussion as to the qualifications of condensed milk as a substitute for the human article. Some men strongly advocate its use, while others bitterly condemn it. After reporting a case of infantile scurvy, in a foreign exchange, Dr. Edmund Owen says :

"The opinion which I have been compelled to form in my work in the out-patient rooms of the Children's Hospital, is that the worst nourished of the hand-fed infants are those that have been reared upon condensed milk and the various patent food stuffs; and that whenever an infant cannot have human breast-milk, the best substitute will be found in fresh cow's milk prepared and administered *secundum artem*.—*Med. and Surg. Rep.*, March 29, 1884.

## THE ESTIMATION OF THE ALKALOIDS IN THE ROOT OF ATROPA BELADONNA.

BY WYNDHAM R. DUNSTAN,

*Assistant Lecturer in Chemistry and Physics to the Pharmaceutical Society  
and Demonstrator of Practical Chemistry in the School of Pharmacy; and*

F. RANSOM.

Many methods have been proposed for the estimation of the alkaloids which exist in *Atropa Belladonna*. The majority of these methods involve the use of solvents which extract large quantities of non-alkaloidal organic substances, and thus necessitate the subsequent use of other solvents and precipitants to purify and isolate the alkaloid. A great advance was made by Pesci (*Gazzetta di Chimica Italiana*, x, 425), when he showed that the alkaloid could be extracted in a comparatively pure state by benzene from an aqueous extract of belladonna after the addition of an alkali. The benzene was then agitated with dilute sulphuric acid, which was subsequently rendered alkaline with ammonia and the alkaloid removed by chloroform. Pesci's method of extraction, although a great improvement upon older methods, was still far from perfect, and obviously could not be easily applied for the estimation of the alkaloid. In a previous paper<sup>1</sup> one of us has proposed a new method in plant analysis where a body soluble in chloroform has to be isolated. This method was based upon the general principle that in plant analysis that solvent should be selected for the estimation of the active constituent which extracts this constituent with the smallest quantity of the other constituents, thus rendering unnecessary long processes of subsequent purification.

There are many solvents which can be used for this purpose, solvents which easily dissolve alkaloids, glucosides, etc., but less readily dissolve coloring matter, acids, sugars, etc. Chloroform is one which often admits of use, but it was pointed out in the paper referred to that chloroform alone was ill-suited for completely extracting the plant tissues, owing to its weak, penetrating power. It was also proved in the special instance of *nux vomica* that this difficulty could be overcome by the admixture of alcohol with the chloroform; that is to say, while chloroform alone was incapable of extracting the whole of the

<sup>1</sup> Dunstan and Short, "The Assay of *Nux Vomica*" "Pharm. Jour.," [3], xiii, 665; "Amer. Jour. Phar.," 1883, p. 268.

alkaloid from *nux vomica*, when mixed with 25 per cent. of alcohol it was able to do so thoroughly and completely, leaving behind the whole of the mucilaginous constituents of the seeds and the other non-alkaloidal constituents, many of which would be extracted if alcohol alone were used. In the present paper we have extended this method of extraction with the chloroform-alcohol mixture to the isolation of the atropine and hyoscyamine existing in the root of *Atropa Belladonna*.

In preliminary experiments 10 grams of very finely powdered belladonna root were extracted with chloroform alone in a Dunstan and Short's extraction apparatus. The operation continued for three hours, during which time the root had been percolated twenty successive times with 50 cubic centimetres of boiling chloroform. The percolate, which had a light brown color, contained much alkaloid when the residue was tested with phosphotungstic acid. The marc was mixed with lime and boiled with alcohol. The alcoholic residue also gave evidence of containing abundance of alkaloid when tested with phosphotungstic acid and also by its action upon the pupil of the eye. Thus the chloroform had not completely exhausted the root of alkaloid; the experiment was again repeated, the chloroform being allowed to act for a longer time, but yet the marc contained considerably more than traces of alkaloid. The same quantity of finely powdered belladonna root was now acted upon by a mixture of equal parts of chloroform and absolute alcohol under precisely the same conditions. The percolate contained much alkaloid, but no trace could be detected in the remaining marc. This experiment was likewise repeated several times with the same result. It was thus evident that just as chloroform alone had been shown to be an inefficient extractive agent for *nux vomica* it was now shown that the same obtains with belladonna, and similarly as a mixture of chloroform and alcohol was an excellent solvent for the *nux vomica* alkaloids, so the same mixture was an equally good solvent for the alkaloidal salts in belladonna. The next experiments were made with different proportions of chloroform and alcohol. A mixture of chloroform with 25 per cent. of alcohol occupied too long a time in accomplishing complete exhaustion to allow it to be made the basis of an easy process for general use. The best results were obtained with a mixture of equal parts of chloroform and absolute alcohol, which consequently was used in further experiments. It was found necessary to use absolute alcohol on account of the action of the water contained in rectified spirit upon the belladonna, which

by causing swelling of the root and consequent clogging of the apparatus, seriously impeding the progress of percolation.

In these experiments the root was exhausted at the boiling point of the solvent ( $60^{\circ} - 80^{\circ} \text{C.}$ ). Experiments were now made to see whether belladonna could be efficiently exhausted by a mixture of equal parts of chloroform and alcohol without the aid of heat; but it was found that after percolating 10 grams of the finely powdered root with 150 cubic centimetres of the mixture the marc still contained a large amount of alkaloid, and it was evident that a great quantity of the solvent would be required for complete exhaustion. This, although not an insuperable objection is a practical disadvantage, and having found that the belladonna root could be so well exhausted by the boiling solvent, we at once proceeded to examine the effect of a boiling mixture of chloroform and alcohol upon atropine under the conditions of our experiments, and so to discover whether the alkaloid would be injuriously affected at the boiling point of the mixture. Pure atropine was boiled for six hours in an apparatus with an upright condenser with a mixture of alcohol and chloroform. The mixture was then agitated with dilute sulphuric acid and the alkaloid recovered from the acid liquid, after the addition of ammonia, by chloroform. The following results were obtained:

	Atropine taken.	Atropine found.
<i>a</i> .....	0.085	0.084
<i>b</i> .....	0.221	0.217
<i>γ</i> .....	0.199	0.197
<i>d</i> .....	0.213	0.208

The small differences in these figures are obviously accounted for by experimental errors, and the results, taken in conjunction with the fact that the residues were normally crystalline, prove that atropine is not decomposed or chemically altered even when exposed for six hours at the boiling point of the solvent which is proposed for use. We were now able to proceed further in developing the process. The belladonna root was now able to be exhausted with a boiling mixture of chloroform and alcohol, and it now remained to isolate the alkaloid in a pure state from the solvent. Dilute acids were at first used for this purpose, but it was afterwards discovered that the whole of the alkaloid could be withdrawn from the chloroform-alcohol mixture by merely agitating with water; two successive treatments with water in this way sufficed to remove every trace of the alkaloids from the



chloroform-alcohol mixture. The separation of the water from the mixture is instantaneous and entire if the mixture is gently warmed; nearly the whole of the coloring matter remains dissolved in the chloroform, whilst the water retains the alcohol and the alkaloidal salts. By rendering the aqueous solution alkaline with ammonia and agitating with chloroform the atropine and hyoscyamine were obtained after evaporation in an apparently pure state; that is to say, the residue was entirely soluble in dilute acids, and when dissolved in chloroform and the solvent spontaneously evaporated the alkaloid remained as a mass of white silky crystals. However, one of the most important points to be demonstrated in such investigations as these is the perfect purity of the final alkaloidal residue, and yet this is a point which is generally assumed and not proved by workers in this field.

On a previous occasion<sup>1</sup> one of us has proposed a method for ascertaining the purity of residues of strychnine and brucine, which is founded upon the complete precipitation of these alkaloids (when nearly free from other organic substances) by a solution of tannin rendered faintly alkaline with ammonia. This process was tried with atropine and hyoscyamine, but with negative results, for the precipitate at first formed was soluble in excess of the reagent. Other reagents were now experimented with. Potassium mercuric iodide was found to be by no means a complete precipitant of atropine, and is useless for its detection when present in small quantity. Picric acid is also useless alike for the detection and estimation of atropine; even when considerable quantities of the alkaloid are present in solution this reagent fails to afford any indication. Phosphotungstic and phosphomolybdic acids are far more delicate than the former reagents, but even these are not sufficiently exact for quantitative use. As far as the detection of atropine and hyoscyamine is concerned a very delicate test is the dilating action upon the eye's pupil which is distinctly yielded by mere traces of the alkaloids. After attempting the quantitative application of many of the alkaloid precipitants with no success, we found one reagent which is admirably adapted for quantitative use. A solution of iodine in potassium iodide completely precipitates even traces of atropine and hyoscyamine, from a solution in dilute hydrochloric acid, as the dark green periodides. When other acids are present the precipitation is not quite so complete. After a great number

<sup>1</sup> Dunstan and Short, "The Analysis of some Authentic Specimens of *Nux Vomica*" (*Pharm. Jour.*, [3], xiii, 1053).

of experiments had been made with this reagent, and also in reference to the decomposition of the periodides, we devised the following method for estimating the purity of residues of atropine and hyoseyamine. The alkaloidal residue is dissolved in dilute hydrochloric acid and to this liquid is added excess of a strong solution of iodine in potassium iodide. The precipitate which at once agglomerates is filtered off, slightly washed with the solution of iodine and decomposed upon the filter with a solution of sodium thiosulphate, when it entirely dissolves, forming a colorless liquid from which the alkaloid is removed by agitation with chloroform. This process gave very satisfactory results with pure atropine, and the following results were obtained with the alkaloidal residues obtained in our experiments:

	Residue taken.	Pure alkaloid found.
1.....	0.020	0.0185
2.....	0.019	0.0175
3.....	0.078	0.079
4.....	0.078	0.076

These figures indicate that the final residue of alkaloid obtained from belladonna root by the process which we have described consists of pure alkaloid. It should be noted that both atropine and hyoseyamine are much affected by prolonged exposure at 100° C., becoming sensibly darker in color. The residues of alkaloid obtained in the process, and which usually weigh rather less than 0.1 gram, are light yellow in color and have a fused appearance; crystals of the alkaloids may be obtained by redissolving in chloroform and spontaneously evaporating, when silky needles will remain if the chloroform was free from water. The following is a detailed description of the process which we propose for the estimation of the atropine and hyoseyamine in belladonna root. Twenty grams of the dry and finely powdered root are exhausted by hot percolation with a mixture of equal parts by volume of chloroform and absolute alcohol; if an extraction apparatus is used about 60 cc. of the mixture is required. The percolate is agitated with two successive 25 cc. of distilled water, which are separated in the usual way. These are mixed and well agitated with chloroform to remove the last traces of mechanically adherent coloring matter. The chloroform is separated, the aqueous liquid rendered alkaline with ammonia and agitated with two successive 25 cc. of chloroform, which are separated, mixed and agitated with a small quantity of water (rendered faintly alkaline with ammonia) to remove

adherent aqueous liquid. The chloroform is then evaporated over a water-bath until the weight of the atropine and hyoscyamine is constant, which usually occupies a little less than one hour.

The special features which distinguish this process are, (1) it is simple and accurate; (2) a high temperature is avoided; (3) the solvent employed extracts a minimum of non-alkaloidal constituents; (4) no precipitants are used; (5) the use of acids is avoided; (6) the alkaloids are not heated with alkalies.

The root of *Atropa belladonna* grown at Hitchin and carefully dried at 100° F. yielded 0.38 per cent. of total alkaloid (atropine and hyoscyamine) when estimated by this process. Other specimens estimated in the same way yielded 0.39 per cent. and 0.35 per cent. of total alkaloid.

The work connected with this investigation has been aided by a grant from the Research Fund of the British Pharmaceutical Conference. In a future communication we propose to show how this process can be applied to the estimation of the atropine and hyoscyamine in other parts of the plant.—*Pharm. Jour. and Transactions*, February 9, 1884, p. 623.

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## NOTES ON TINCTURE OF HYOSCYAMUS.<sup>1</sup>

BY WILLIAM GILMOUR.

Some time ago I had a sample of tincture of hyoscyamus given me to examine, which had a peculiar odor not at all characteristic of this tincture, and which also gave on the addition of water a milkiness much more decided than anything I had ever previously observed with hyoscyamus. It is sometimes not easy to distinguish a familiar odor if cunningly masked, but here there was little difficulty, particularly on diluting the tincture with water, in discovering the all-pervading odor of balsam of copaivi, and the supposition was that the hyoscyamus leaves from which the tincture had been prepared were annual leaves and had been sophisticated with the balsam so as to give the heavy odor and the milky opacity on the addition of water, characteristic of a tincture prepared from the biennial leaves. The idea was an ingenious one, particularly if we bear in mind that the annual hyoscy-

<sup>1</sup> Read at an Evening Meeting of the North British Branch of the Pharmaceutical Society, March 19, 1884.

amus can at present be bought for as many pence as the biennial costs shillings. Unfortunately for the idea, the contamination was ultimately discovered to be accidental, but to this accident you are indebted for the following short notes.

There have been only two methods proposed, so far as I am aware, to distinguish a tincture prepared from the annual henbane leaves from one prepared as officially directed from the biennial, namely, that of the spectroscope, by the late Mr. Stoddart, and that of a milky opacity on the addition of water, by Mr. Donovan.

In the "Medical Press and Circular," of 1871, Mr. Donovan directs "a little of the tincture to be added to a glass of water, when if the mixture becomes slightly milky the tincture (he states) is made from a two years old plant, but if it remain transparent the plant has been in its first year." Regarding the first mentioned test, Mr. Stoddart (in vol. xi, [2], "Pharmaceutical Journal," 1869-1870), after describing the spectrum of the biennial tincture, which gives four very dark bands, goes on to remark of the tincture prepared from the annual plant, "This spectrum is very different to the last and cannot be mistaken for it. The chlorophyll line at B is not so decided, the second and third lines so weak as to be barely visible and the fourth absent." A year later, writing in the same journal on Bristol Pharmacology, he puts the statement even more strongly, thus: "Authors have been undecided as to whether the biennial and annual plants should be regarded as distinct varieties, or the latter only a more mature growth of the former. The latter is probably the true state of the case. . . . The microspectroscope will immediately decide whether the tincture has been made from the biennial plant. Five dark bands are distinctly seen which are not visible in that from the annual." Both tests, I may state, have been repeatedly quoted since as authoritative. Thus, so recently as vol. viii of the present series, we have the writer of the month article, in the "Pharmaceutical Journal," making reference to both and saying that "practical pharmacists should not forget that the tincture of this plant (annual) does not show a milkyness when mixed with water, as that made from the biennial does, nor that the preparation made from the two kinds can be distinguished, as shown by Stoddart, by means of the spectroscope." Now it is not easy for investigators to arrive at any definite conclusion as to what is meant *commercially* by annual henbane, I find that the term applies indiscriminately to leaves derived from a variety of sources. Thus we have the British



annual henbane proper; and the root leaves of the biennial plant, which Mr. Holmes informs me usually forms the annual of English commerce; then there is what is known as German henbane, and probably a whole variety known somewhat vaguely as exotic henbane. Through the kindness and courtesy of Mr. Holmes, of the Museum department of the Society in London, I received samples of different kinds of henbane (samples of these as well as tinctures prepared from them are on the table and may be examined by members), and among others, one sample of the real German annual. I am persuaded, after comparing somewhat minutely this sample with those of the commercial received by favor from various wholesale houses, that very much of the annual henbane at present in circulation is of German origin. Be this as it may, what we, as practical pharmacists, have to do is to accept and judge matters as we actually find them, and, therefore, I have to point out that of all the annual specimens which I have examined, I have not found one which did not give a spectrum as well defined as that derived from any specimen of the biennial plant. Indeed, I have found the bands of the spectrum more uniform and and more decided from the various specimens of the annual plant which I have examined, than I have found from an equal number of specimens of the biennial plant. We must, therefore, once for all give up the spectroscope as an agent for distinguishing the one from the other.

It is probably not in the power of every one to apply a spectroscope to his tincture, but I will here shortly describe how a rough but very fair test may be applied to this tincture, showing its age, quality, etc., without going to the expense of a spectroscope.

To two parts of tincture in a test tube, add one part ordinary commercial benzole; shake thoroughly and allow to stand for a short time. The benzole will be found to separate, taking with it almost every particle of green coloring matter, leaving after a time a clear tincture beneath. So thoroughly does the benzole extract the chlorophyll that it leaves scarcely a trace of a dark band in the tincture beneath, and from the depth of the green solution above as well as from the color of the brown tincture below as good an indication will be given of the value of the tincture as can be got almost from the spectroscope itself. I have here a whole series of test tubes filled with tinctures thus treated, and, as can be seen at once, the shades of color vary considerably, both in the chlorophyll solution above and in the tincture beneath.

The history of these different tinctures will be referred to immediately, but I would in the meantime call attention to test tube numbered 3, which contains the tincture of German annual received from Mr. Holmes and which you will find not the least marked both as regards the chlorophyll solution above and the brown tincture beneath. So much for the spectroscope as discriminating between a tincture prepared from the annual and biennial plants.

Coming now to the other test, namely, that of the milky opacity on the addition of water, I have not found one single sample of biennial which failed to give it, nor can I recollect of ever coming across such a sample during the last eight or ten years in the ordinary course of business. I would, therefore, unhesitatingly reject as bad, owing to age, or from some defect in drying or from exposure, or other cause, any biennial plant the tincture from which failed to yield it. In saying this, however, I am saying all that can be said for this test. It is *not* a test which can distinguish the biennial tincture from the annual, for I have come across as many specimens of the latter which do give the milkiess as of those which fail to give it. Of those which give the milkiess, some give it at once, while others only give it after standing for some time. This last fact may be the reason why the reaction has not been more frequently observed. The tincture from the German annual, which we have here, for example, gives it readily and copiously, and, in every respect as well, answers all the tests of a good biennial specimen, with the exception of the odor. Probably most will have noticed the heavy fetid odor (not unlike ox-gall) which the biennial tincture gives on the addition of caustic potash. This peculiar odor is almost entirely wanting in every specimen of tincture prepared from the annual plant which I have examined, the odor being quite different. In this respect the sample of the annual on the table closely resembles the tincture prepared from the large stem leaves of the biennial sample received from Mr. Holmes. This sample makes a very inferior tincture and is not for a moment to be compared to the tincture prepared from the leafy tops received also from Mr. Holmes.

It was originally my intention to have confined my notes to the two points touched upon, but after proceeding with the examination of the different specimens placed at my disposal, my attention was directed to a paper read by Mr. Gerrard, at the last meeting of the Pharmaceutical Conference, on "The Odorous principle of Henbane Leaf." In a concluding note to this paper, in which Mr. Gerrard practically applies

his investigations to pharmacy, he points out not only what I have just shown as regards the turbidity test, but goes on also to deduce several conclusions from it which, according to my experience, will, I think, scarcely stand the test of experiment. He states, for example, that "many samples of tincture of henbane almost lose their property of becoming turbid with water; this is generally the result of age, for such a tincture will be found to have lost its original green color and changed to a brown with formation of the usual dark deposit. Thus deposition and disappearance of turbidity are simultaneous and proportionate. As to the nature of the deposit in the tincture, I believe if examined it will be found to consist of a mixture of odorous principle, fat and chlorophyll, the separation of which is slowly effected by the agency of the water in the proof spirit; if this be so, then it is an argument for the use of a stronger alcohol in the making of the tincture of henbane."

I called Mr. Gerrard's attention to the fact that I had exposed a tincture of henbane to ordinary light (no sunshine), and in three weeks it had lost almost every trace of green coloring principle, while it had not deposited in the least, nor had it lost its property of becoming turbid with water. To this Mr. Gerrard replied that the tincture had not been kept sufficiently long, but that with the changing of the chlorophyll the tincture would have become acid (it shows no signs of acidity up to the present time), this acidity increasing with age, and that the deposit referred to by him would take from three to six months to form. I believe Mr. Gerrard is quite right in his observations, although I think he is wrong in his deduction that this change "is slowly effected by the agency of the water in the proof spirit." Some years ago I pointed out that these very changes here described by Mr. Gerrard took place in olive oil on exposing it to light. There was the first gradual decomposition of the chlorophyll and the disappearance of the bands in the spectroscope; next an increasing cloudiness in the oil, accompanied by an increasing acidity, all of which, I have no doubt, would have ended in a deposit as described by Mr. Gerrard had the density of the oil permitted this, or had it been kept long enough. The water could scarcely in this instance be said to be the agent which either favored decomposition or tended to effect separation. But further and more important still, I have to point out the much greater susceptibility of a tincture of henbane to change when prepared with a stronger as compared with a weaker alcohol. I have

prepared duplicate tinctures with rectified spirit of every sample of henbane on the table, and two things cannot fail at once to strike even an ordinary observer regarding them, namely, first, the close resemblance which they all (annual and biennial) bear to each other, and, second, the striking unlikeness which they have to a tincture prepared from proof spirit. They have all the same deep green coloration, not unlike essence of bergamot, or better still, like commercial cajeput oil, and this characteristic feature, so striking in the first instance, is equally remarkable for its evanescence on exposure. I find that even twelve hours exposure will quite change their appearance, and this change goes on so rapidly that towards the end of a week the tincture becomes almost decolorized. I have here two tinctures thus exposed, which you can compare with samples of the same tincture carefully preserved. Twelve hours' exposure removed every trace of bright green, converting the tincture into a brown olive, and this in turn gradually faded, until it reached on the seventh day the dirty straw white which you now see. This you will admit is of itself a very serious objection to any change in the spirit strength of the tincture, more especially if we keep in mind, comparatively speaking, the permanent character (to the naked eye) of the official tincture, three weeks' exposure under similar conditions making scarcely any observable difference in it.

There is still one more objection to changing the spirit strength of this tincture, and to my mind it is the most serious of all, namely, that the stronger spirit does not exhaust the leaves of their active principle. In saying this I know that I am going not only in the face of Mr. Gerrard, but also of such an eminent authority as Christison, who says that the leaves impart their active principle alike to alcohol and proof spirit. From the very great change which has taken place in the rectified spirit tincture on exposure, as well as from the entire absence of any coloring principle except the chlorophyll when treated with benzole as already described (on agitating the rectified spirit tincture with water and benzole, the benzole extracts every particle of green coloring matter and leaves the tincture beneath absolutely colorless), I think there is every reason to conclude that the stronger alcohol exhausts the leaves to a very great extent of their green coloring matter and not to any extent of their active principle. In further proof of this I have to point out that with wonderful uniformity all the proof spirit tinctures contain from five to six times the amount of extractive matter



compared with the stronger spirit tinctures prepared from the same samples. The table underneath sufficiently explains itself.

- No. 1. German annual, proof spt. = 1·05 per cent. extractive.
- No. 2. German annual, rect. spt. = ·20 per cent. extractive.
- No. 3. Large leaf biennial *ver.*, proof spt. = 1·40 per cent. extractive.
- No. 4. Large leaf biennial *ver.*, rect. spt. ·20 per cent. extractive.
- No. 5. Biennial tops *ver.*, proof spt. = 1·40 per cent. extractive.
- No. 6. Biennial tops *ver.*, rect. spt. = ·20 per cent. extractive.
- No. 7. Biennial commercial (1), proof spt. = 1·20 per cent. extractive.
- No. 8. Biennial commercial, rect. spt. = ·21 per cent. extractive.
- No. 9. Biennial commercial (2), proof spt. = 1·20 per cent. extractive.
- No. 10. Biennial commercial, rect. spt. = ·5 per cent. extractive.

Of course extractive matter is not active principle, and the correct plan to determine the relative value of the two tinctures would be to estimate the amount of hyoscyamine present in them. I have been experimenting on quantities much too small to permit of this, and, moreover, it was not my intention, as I have already explained, to enter into the question of a stronger or a weaker tincture, so that I have not had time to do so, even although I had so desired.

To sum up my observations, we have :

*First.* The fact that the spectroscope does *not* distinguish between a tincture made from an annual or a biennial plant.

*Second.* That the milky turbidity on the addition of water is not a test to distinguish the one from the other; but it is a fairly good test as to the quality, as far as age, exposure, etc., of the biennial plant is concerned.

*Third.* That a proof spirit tincture, although quickly changing so far as the chlorophyll matter is concerned, does not show this change to any extent to the naked eye, while the more important chemical changes which ultimately affect the quality of the tincture therapeutically are comparatively slow.

*Fourth.* That a rectified spirit tincture undergoes very rapid changes, which are very conspicuous to the naked eye, and which are almost certain to end in rapid chemical changes affecting the therapeutic value (if it possesses any) of the tincture.

*Fifth.* That rectified spirit does not possess the same power of exhausting the henbane of its extractive matter as proof spirit.

*Sixth.* That a rectified spirit tincture and a proof spirit tincture are quite unlike in their appearance, so much so as practically to make them unrecognizable.—*Phar. Jour. Trans.*, March March, 29, 1884, p. 781.

## KAIRINE AND KAIROLINE.

(HYDROXYQUINOLINEMETHYL HYDRIDE AND QUINOLINEMETHYL HYDRIDE.)

BY FILEHNE.

The present paper treats of the physiological properties of these bodies. They are both, as well as some other compounds of the quino-line series, very powerful anti-pyretics, but have no local action, and are, therefore, valuable medicines in cases of fever. They are quite similar in action; kairoline is, however, less energetic and slower in action than kairine. Kairine has been tried in a series of acute and chronic febrile diseases, and in all, its antithermic action was found to be constant.

The hydrochloride is the salt employed; it is a clear crystalline greyish-yellow powder, very soluble in water, and has a bitter somewhat aromatic taste. After administering the powder, water should be drunk freely. Its use is not accompanied by any unpleasant effects, such as headache, ringing in the ears, sickness, etc. With regard to its antithermic properties, doses of 1 to 1.5 gram in healthy adults have no physiological action and no effect on the temperature; whilst in cases of adult patients or debilitated subjects, a dose of 1 gram every two hours must not be exceeded, otherwise cyanosis is apt to ensue. The most suitable dose in adult fever cases is 0.3 to 0.5 gram every hour or 1½ hour. The interval between 1 gram doses should not exceed 2½ hours, and that between 0.5 gram doses not more than 1½ to 2 hours, for the effect of 1 gram only lasts three hours, whilst that of 0.5 gram is of 2¼ hours' duration; to produce a less pronounced effect reduce the doses, but do not increase the interval. When the influence of the drug ceases, the temperature rises again with a feeling of chilliness amounting sometimes to actual rigor. Less than 0.3 gram given at once has no practical effect on the temperature, a dose of 0.3 to 1 gram lowers the temperature by ½ to 2°, another dose given before the effect of the former one passes away, causes a further reduction, and if 0.5 gram be given hourly, it invariably follows that, without any injurious effect, the temperature falls to the normal point or below it after the fourth (sometimes after the third, or even the second) dose. The temperature cannot be brought below 37 — 36.5°, and the low temperature is maintained only as long as the administration of the

drug is continued every  $2\frac{1}{2}$  hours at least, otherwise shivering occurs, and the temperature rises to the point corresponding to the acuteness of the disease; this drawback is overcome, so as not to disturb the night's rest, by judicious dosing during the day, and by giving a full dose of 2 grams of *kairoline* the last thing at night. The action of kairine begins 25 minutes after the dose of 0.5 to 1 gram is taken by the mouth; the fall in temperature is more rapid the larger the dose, and is always accompanied by profuse sweating, which lasts only as long as the temperature continues to fall. During the use of these drugs, the urine becomes green, but contains no sugar or albumin. Pneumonia patients especially have enjoyed great comfort from the use of this drug; in fact, such cases can be kept quite free of fever. It is suggested to use kairine as a remedy in malarial affections, by giving 1 gram hourly, three hours before the expected attacks.—*Phar. Jour. and Trans.* [3], 14, 383, 384; *Jour. Chem. Soc.*, April, 1884, p. 474.

## VARIETIES.

PEPTONES IN THE URINE have recently ("Miss. Val. Med. Monthly") received considerable attention; some observers suppose their presence is of special clinical importance, indicating a morbid state analogous to, or possibly an early stage of granular contracted kidney. The elaborate investigation of Dr. R. W. Jaksch, however, tended to discredit this view. He found that peptones appeared in the urine with great frequency in cases where there was a considerable amount of suppuration from whatever cause, or where there was a large amount of exudation; he found it in every one of twenty cases of phthisis with purulent expectoration, and of five cases of epidemic cerebro-spinal meningitis, and twelve cases of acute rheumatism, as well as in twenty-four out of twenty-nine cases of croupous pneumonia. He believes that the peptonuria is due to the reabsorption of the inflammatory products, and does not depend in any way on the condition of the kidneys.—*Weekly Med. Review*, March 15, 1884.

A CAUTION ABOUT JEQUIRITY.—After reporting a case of sloughing of the cornea after the use of jequirity, in the "Weekly Medical Review," February 23, 1884, Dr. S. Pollak formulates as follows:

1. Jequirity is by far the best remedy which has been hitherto used for trachoma and pannus.
2. It does all, and more speedily, that has ever been claimed for purulent inoculation, minus the repulsiveness of the last remedy.
3. The infusion of jequirity must be used only when perfectly fresh. After four or five days it swarms with bacteria, when the danger of their entering the tissue and causing a septic state is very great.

4. Sterilizing the infusion requires much care and labor, and may not always be practicable. It will doubtless retard the decomposition, but it will not prevent it entirely.

5. The full therapeutic utility of jequirity will only be attained when chemistry shall have succeeded in preparing an alkaloid of it, which will keep, and the strength of it is properly known.—*Med. and Surg. Rep.*, March 22.

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VALUE OF ETHER AND CHLOROFORM.—Dr. J. W. Parkinson's conclusions are as follows: 1. That ether is as efficient an anæsthetic as chloroform. 2. That there are fewer cases in which its use is contra-indicated. 3. That it is a safer anæsthetic in the hands of the most experienced, and by inference corresponding in an increased ratio with those more or less unskilled. 4. That the use of chloroform with our present knowledge and experience, in preference to ether, where no contra-indication to the latter can be shown, is adding materially to the risk of the patient and the responsibility of the administrator.—*Pacif. Med. and Surg. Jour.*

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TOXIC ACTION OF COPPER.—It seems to grow more and more doubtful whether copper can be reckoned among the poisonous metals. Of course in large quantities it is noxious; but this is true of alcohol and of many other compounds which cannot fairly be considered as poisonous. The latest experiments tend to indicate that at any rate copper is not a cumulative poison, like lead. MM. Houlès and De Pietra Santa, in a recent communication addressed to the Académie des Sciences of Paris, report that they have been unable to discover any injurious action on the health of the workmen engaged in the copper industry, and have come to the conclusion that the so-called "*colique de cuivre*," asserted in the eighteenth century to be a definite disease, does not exist.—*Lancet; Louisv. Med. News.*, March 15.

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TURPENTINE AS A PROPHYLACTIC IN INFECTIOUS DISEASES.—The "Medical Record" tells us that H. Vilandt writes in the "Ugeskrift for Laeger," vol. viii, No. 8, 1883, concerning the value of the oil of turpentine in the treatment and prophylaxis of diphtheria and the exanthematous diseases. He states that he has never seen any of these diseases spread from a sick child to other members of the family when this remedy was employed. In many of his cases no isolation could be attempted, as the mother was the only female in the family, and was obliged to take care of both the sick and the well, continually passing back and forth from one to the other. His method was to pour from twenty to forty drops of a mixture of equal parts of turpentine and carbolic acid into a kettle of water, which was kept simmering over a slow fire, so that the air of the sick-room was kept constantly impregnated with the odor of these two substances. He claims also that by this means a favorable influence is exerted upon the exudation in diphtheria, although it is by no means curative of the disease, and should never be relied upon to the exclusion of other remedies.—*Med. and Surg. Rep.*, March 29, 1884.



CONVALLARIA MAJALIS is not as perfectly safe as some have believed. Dr. George Herschell relates in the "*Lancet*" the case of a man, apparently healthy, who had an irregular pulse following worry and overwork two years ago. The patient had been taking digitalis, but this was discontinued, and, after an interval of a month or two, tincture of convallaria was ordered in five minim doses three times a day. After a few doses he was obliged to stop its use on account of its remarkable effects. Almost immediately after taking a dose the pulse became nearly imperceptible at the wrist, and there was a sense of oppression over the sternum, nausea, cold feet, vertigo, flatulence, and a feeling of utter prostration. These symptoms lasted two hours, but came on again at each repetition of the dose.—*Weekly Med. Review*, Dec. 1, 1883.

RAPIDLY DRYING VARNISH.—W. Dauner recommends the following: Mix intimately colophony with thick milk of lime; after 24 hours dry by heat and powder. This powder is used for preparing varnishes from soft resins as follows: Melt 100 parts of pine resin, add with constant stirring 10 to 15 parts of the above powder, continue to heat for 30 minutes, remove from the fire and add linseed oil 25 to 50 parts and oil of turpentine 35 to 90 parts, according to the thickness desired.—*Hoffm. Papierzeitung*.

## MINUTES OF THE COLLEGE.

PHILADELPHIA, March 31, 1884.

The annual meeting of the Philadelphia College of Pharmacy was held this day at the College Hall, No. 145 North Tenth street. The President called the meeting to order at 3.30 P. M. The registry showed 20 members in attendance.

The minutes of the last meeting were read, and, on motion, adopted.

Wm. C. Bakes, Secretary of the Board of Trustees, read the minutes of the Board for January, February and March, which were, on motion, approved.

From these minutes and others of the Board of Trustees during November, 1883, the College is informed that in accordance with its request the Board has elected a number of gentlemen Honorary and Corresponding Members, and that replies have been received from many of them acknowledging the receipt of the certificate of membership.

The names of the gentlemen elected are as follows, viz.:

*Honorary Members.*—Prof. John Attfield, London, England; Prof. G. Planchon, Paris, France; Prof. G. Dragendorff, Dorpat, Russia; Thomas Greenish, London, England; E. M. Holmes, London, England; Prof. H. Baillon, Paris, France; Dr. Hermann Hager, Pulvermühle, Fürstenberg, Germany; Dr. Oswald Hesse, Feuerbach, near Stuttgart, Germany; Prof. Edward Schaer, Zurich, Switzerland; Prof. Robert Bentley, London, England; Prof. A. Ladenburg, Kiel, Germany.

*Corresponding Members.*—H. P. Madsen, Copenhagen, Denmark; Prof. E. Reichardt, Jena, Germany; Bruno Hirsch, Frankfort on the Main, Germany; Edmund Van Melekebeke, Antwerp, Belgium; Ch. Tanret,

Paris, France; Charles Patrouillard, Gisors, France; Prof. C. Méhu, Paris, France; George F. Schacht, Clifton, England; A. W. Gerrard, London, England; Richard Reynolds, Leeds, England; Charles Symes, Liverpool, England; Prof. V. Podwissotzki, Dorpat, Russia; H. Bonnewyn, Ixelles, Belgium; D. A. Van Bastelaer, Marcinelle, Belgium.

Thomas S. Wiegand, Librarian, read his annual report, which was, on motion, adopted:

PHILADELPHIA, March 31, 1884.

The Librarian respectfully reports that there has been added to the library a number of new and valuable works, mostly scientific or pertaining directly to pharmacy; a number of volumes of theses have been bound, and most of the exchanges which we preserve have also been placed on our shelves; new shelving having been built, a better arrangement of the books is now possible.

The report of the Curator for the year was read by Mr. Zeller. It was, on motion, accepted, and the recommendations therein contained, were referred to the Board of Trustees for their consideration.

PHILADELPHIA, March 31, 1884.

*To the President and Members of the Philadelphia College of Pharmacy:*

The Curator desires to respectfully report that progress has been made in the arrangement of the cabinet. Since the erection of the new cases on the south side of the museum, many specimens that had accumulated from want of space have been cared for and arranged for exhibition. Most prominent among these is the collection from East India, numbering 94 handsome specimens in good condition; next in number are 91 samples of drugs from Japan, these, with the original collection shown at the Centennial Exhibition, gives an aggregate of 300 specimens representing Japanese *Materia Medica*. 54 specimens received from the Pharmaceutical Society of Great Britain, through Mr. Holmes, their Curator, have been given a prominent position, also 46 specimens of indigenous Mexican drugs received from the Academy of Natural Sciences of this city, through Dr. Ruschenberger. (This is a portion of the collection arranged by Prof. Herrera for the Mexican exhibit during the Centennial, and contains many rare and beautiful specimens.) A collection of 39 specimens which have been arranged, are interesting from the fact that they belonged to a lot from British Guiana and were exhibited in the Crystal Palace Exhibition in New York, in 1849. Seven fine samples of *Cinchona* barks, 33 Brazilian, and 30 California specimens, with a series of 18 bottles of Aniline colors, and 120 Chemical specimens from the Mallinckrodt Co., of St. Louis, in all 531 new specimens have been re-labeled, rearranged, and are now ready for inspection. In order to facilitate the finding of specimens and to aid students in comparing the same, the plan of arranging them as much as practicable according to the order in which they are lectured upon has been adopted. Another feature introduced during the year was that of devoting a case for the reception of products (mostly pharmaceutical preparations) which were handed in by the students with their thesis; this exhibit seemed to be appreciated during the course just closed, and it will no doubt be the means of increasing the number of pharmaceutical specimens. The *Cinchona*, *Opium* and *Eucalyptus* collections have been rearranged and displayed in the most prominent places in a new case, and can now be studied to best advantage. Although the cases just built have given room adequate for the present number of specimens, it is respectfully suggested that more room be obtained for future additions, the shelf room not now in use is limited and will very likely soon be filled, the Curator respectfully recommends that a gallery be constructed over the present alcove cases during the coming summer; it is suggested that the work be done during

the coming months, as it would be impracticable during the College course. 2,350 specimens are now on exhibition.

Respectfully submitted,

CHAS. FRED'K ZELLER.

Henry N. Rittenhouse, Chairman of the Publishing Committee, read their report for the year, as follows, viz. :

PHILADELPHIA, March 31, 1883.

*To the Officers and Members of the Philadelphia College of Pharmacy :*

GENTLEMEN:—We herewith present our annual report of the work of the Publishing Committee of the College. We have the pleasure to state that the JOURNAL has been issued with its usual regularity and promptness during the past year; its character as a record of the progress of Pharmacy and allied Sciences has maintained the original purpose for which it was first issued.

The vast amount of Pharmaceutical Literature now published, and the low prices of subscription at which most of it is sold (no single journal costing as much as the "Am. Journal of Pharmacy"), is beginning to be felt in our list of subscribers, and during the past year we have lost a number of names.

Since the foundation of the JOURNAL in 1825, the conditions of Pharmaceutical Literature have experienced great changes; Steam and Electricity have manifested their influence in this as in other fields by rapidly disseminating scientific information, as soon as announced, by investigators, and the consequence is a multiplication of publications.

Twenty-seven years ago there was but one journal other than that of this College published in this country in the interests of Pharmacy; but in the past ten years the number has increased to quite ten times as many; most of these journals are published by their owners as a business venture, and are managed with all the energy and enterprise of modern business methods. Advertisement solicitors are numerous and successful, judging from the advertising pages of their issues, and they could well afford to give their journals away, as advertisers seem to be plentiful and rates remunerative. This condition of things, we think, is sufficient to fully account for the loss of a few of our subscribers in the past, and possibly, more in the future.

The reports of the Editor and Business Editor accompany this, and will give in detail the Literary and Financial accounts of the year.

HENRY N. RITTENHOUSE, *Chairman of Committee.*

The Editor's report concerning the publications in the JOURNAL is here-with presented. It is gratifying in some respects, especially wherein he states that an increasing interest has been manifested by members as shown by their more frequent contributions to the pages of the JOURNAL than for several years past, also in the number of papers read before the meetings of the College.

*To the Philadelphia College of Pharmacy :*

The Editor respectfully reports that during the past year ending with the month of March, 1884, there have been published in the JOURNAL 68 original papers, an increase of 11 over the preceding year. Of this number 11 were abstracts of theses, 27 were contributed by 14 members of the College, and 30 papers by 18 non-members. In this statement the editorials, reports, reviews, and similar original matter are not included; nor does it include the original translations and abstracts from foreign journals, of which during the past year Prof. Power contributed 6, and the Editor 11 papers. At the meetings of the College held during the past year 17 papers were read, of which number 11 were by members, and 6 by students of the College. The Editor is pleased to record the fact that a larger number of members have manifested their interest in the JOURNAL during the past year, and that a larger number of papers have been read at the meetings of the Col-



lege, than has been the case since the year 1879-1880; and he sincerely hopes that this increased interest may be continued.

Respectfully submitted,  
JOHN M. MAISCH, *Editor*.

The Business Editor gives a complete detailed financial report of the management of the JOURNAL, showing a satisfactory result considering the difficulties which have to be encountered in competing with the many cheap publications which are issued weekly throughout the country.

The report of the Treasurer of the Publishing Committee as read by Mr. Bullock, gives the usual satisfactory condition of the Committee's finances. It was, on motion, unanimously accepted. Samuel S. Bunting, Treasurer, reported the names of several members who are in arrears to the College. On motion, their names were handed to a committee who will report at the next meeting of the College.

The following preamble and resolutions offered by Prof. Remington were, on motion, unanimously adopted.

WHEREAS, The meetings of the British Association and of the American Association for the Advancement of Science, will take place during the coming month of September, and there will be in attendance many members and others interested in Chemistry, Pharmacy and collateral subjects,

*Resolved*, That the Museum, Laboratories, and Hall of the Philadelphia College of Pharmacy be kept open during the meetings for the inspection and use of the visitors, and that the Actuary be present during the day, with necessary assistance, to receive the visitors.

*Resolved*, That a copy of this resolution be sent to the Committee of Arrangements for the coming meeting, and this invitation be extended to the visiting Associations.

This being the annual meeting, the President ordered an election for officers, trustees, etc., and appointed as tellers Messrs. J. W. Ridpath and J. W. Worthington.

Gustavus Pile moved that a delegation consisting of five members, with power to fill all vacancies which may occur, be elected to represent the College in the annual meeting of the Pennsylvania Pharmaceutical Association, to be held in Wilkesbarre in June next, which was unanimously adopted.

Nominations for all the positions having been made, the tellers proceeded to take a ballot, which they announced as follows, viz.:

*President*.—Dillwyn Parrish.

*1st Vice President*.—Charles Bullock.

*2d Vice President*.—Robert Shoemaker.

*Treasurer*.—Samuel S. Bunting.

*Recording Secretary*.—William J. Jenks.

*Corresponding Secretary*.—Alfred B. Taylor.

*Board of Trustees (for three years)*.—James T. Shinn, T. Morris Perot, Joseph P. Remington. Term expires March, 1887.

*Publication Committee*.—John M. Maisch, Henry N. Rittenhouse, Thomas S. Wiegand, James T. Shinn, Charles Bullock.

*Editor*.—John M. Maisch.

*Librarian*.—Thomas S. Wiegand.

*Curator*.—Charles Frederick Zeller.



Delegates to attend the Pennsylvania Pharmaceutical Association : Gustavus Pile, Alonzo Robbins, Wallace Procter, David W. Ross, William J. Jenks.

There being no further business to claim the attention of the meeting, then, on motion, adjourned.

WM. J. JENKS, *Secretary*.

## MINUTES OF PHARMACEUTICAL MEETING.

PHILADELPHIA, April 15, 1884.

In absence of the president, Mr. John W. Redpath was called to the chair, the minutes of the last meeting were read and approved. Professor Trimble exhibited a specimen of *spruce gum*, an article that is largely used as a chewing gum in the New England States. The specimen was sent by Mr. Clark of last years' junior class.

Prof. Trimble stated that the examination of the hulls of the *Liberian coffee* showed the entire absence of caffeine. The beans of this variety of coffee are among the richest in caffeine of any known.

Mr. Redpath asked if there was any analysis of white ash bark published. To this the reply was made that Prof. Power had intended to pursue the study of the alkaloid present in it; it was also stated that the bark was certainly possessed of decidedly remedial properties, as it has been proved in every case reported.

T. S. WIEGAND, *Registrar*.

## PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

PHILADELPHIA COLLEGE OF PHARMACY.—We regret to state that the list of graduates sent to us for publication was not quite correct, and the editor's sickness prevented him from discovering the mistake made by placing the name of Mr. E. E. Johnson on the list. Thus corrected, the number of graduates was 149 (instead of 150, as stated on page 231 of our last number).

MASSACHUSETTS COLLEGE OF PHARMACY.—The sixteenth annual commencement takes place at the Institute of Technology, Boston, May 2. Addresses will be made by H. Sugden Evans, F. C. S., Prof. W. P. Bolles and F. E. Lovell, Ph.G., and prizes of books and a set of hydrometers will be awarded to the following members of the graduating class: C. T. Nixon (Pharmacy, recitation), F. O. Warner (Pharmacy, examination), F. E. Lovell (general chemistry), C. F. Nixon (materia medica), and C. O. Currier (analytical chemistry). President Henry Canning will confer the Degree of Graduate in Pharmacy upon the following candidates :

William Everett Cates, *Sugar of Milk*.

William Arms Chapin, *Estimation of Caffeine in Commercial Samples of Kola Nuts.*

Charles Joseph Countie, *Anthelmintics and their Mode of Administration.*

Charles Ozni Currier, *Iodine and some of its Preparations.*

Frank Townsend Dudley, *Galls.*

Daniel Emerson, *Assays of Commercial and Special Samples of Tincture of Opium.*

Charles Herbert Goldfwaite, *Volatile Oils.*

George Young Hutchins, *Phytolacca Root and its Preparations.*

James Oscar Jordan, *Solution and Tincture of Chloride of Iron.*

Ernst George William Kraushaar, *Alpinia Officinarum.*

Fred. Ellsworth Lovell, *Syrup of Hypophosphites, and Syrup of Hypophosphites with Iron.*

Charles Frederick Nixon, *Glycyrrhiza and its Official Preparations.*

William Baines Shaw, *Solution and Tincture of Chloride of Iron.*

Frank Osman Warner, *Citrate of Iron and Quinine.*

Honorable mention is to be made of John Henderson Greer, Ph.G., for having taken and passed a satisfactory examination in the Department of Practical and Analytical Chemistry as an Elective.

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## EDITORIAL DEPARTMENT.

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TRIBUTE TO THE MEMORY OF PROFESSOR DR. R. BRIDGES.—We are gratified to be able to present to our readers the greater portion of the biographical sketch of the late Professor Bridges, written by his friend and associate in science, Dr. Ruschenberger. His labors in the Philadelphia College of Pharmacy during a period extending over half a century, merit such a tribute to his memory, still more so his sterling worth as a man and as a teacher of many pharmacists and physicians now residing in all parts of this continent.

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MEDICAL EDUCATION.—At the forthcoming meeting of the American Medical Association at Washington, there will convene, May 5, the Association of American medical editors. The annual address will be delivered by President Leartus Connor, M. D., "On Medical Journalism of the Future," and subsequently a discussion will be had on "How Far can Legislation aid in Elevating the Standard of Medical Education in this Country." The discussion will be opened by Dr. N. S. Davis, and a number of well known physicians have already signified their intention of participating. This subject is also of great interest to pharmacists; for whatever affects the education of the physician, will exert, directly or indirectly, also the question of proper pharmaceutical education. Ignorant physicians will be perfectly satisfied with, and perhaps prefer to seek the dispensing of equally ignorant apothecaries; while he who is accomplished as a physician and general scientist, knows the value of sound information, and its importance in cases involving the patients' health and lives entrusted to his skill. So does the intelligent layman, and acts accordingly in the choice of physician and pharmacist.

The discussion, then, is likely to exert an influence also upon pharmacy in so far as it may point out ways for reaching the desired end, which have

heretofore not been accessible to pharmacists. The influence of legislation in the past upon both professions has been in two entirely different directions. Laws passed during recent years for regulating the practice of medicine we believe have invariably taken the ground that a physician should possess a diploma as evidence of having acquired sufficient special knowledge to be entrusted with the cure and prevention of disease. If this be so, it would seem that the responsibility of what should be considered as "sufficient," rests with the special educational institutions, and if these cannot be made to agree in the premises, that the law would have to define their position more plainly.

It is different, however, with pharmaceutical legislation, which has nowhere in the United States restricted the practice of pharmacy to graduates in pharmacy, although these are granted dispensation from examination by local boards, in most of the States, having enacted pharmacy laws. The pharmaceutical colleges, therefore, it seems to us, would have as the first duty imposed upon them under the laws, indirectly, it is true, but nevertheless imposed upon them, to mould the material presenting itself in perfect agreement with the law, as far as the individual qualities will permit, although these may be unsuitable for attaining that grade of knowledge which is deemed requisite for graduation.

AMERICAN PHARMACEUTICAL ASSOCIATION.—Mr. Henry C. Schranck, the local Secretary, elected in place of Mr. J. R. Drake, who was unable to act, informs us that the Turner Hall has been secured for holding the next meeting in Milwaukee, and also for the exhibition. The hall is centrally located, within three squares of most of the hotels and accessible by all street car lines, and is lofty, well lighted and ventilated. Applications for space should be made to the local Secretary.

## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

*The Cinchona Barks, Pharmacognostically Considered.* By Friedrich A. Flückiger, Ph.D., Professor in the University of Strassburg, etc. Translated from the original text, with some additional notes, by Frederick B. Power, Ph.D., Professor of Pharmacy and Materia Medica in the University of Wisconsin. With eight lithographic plates and one wood-cut. Philadelphia: P. Blakiston, Son & Co., 1884. Large 8vo, pp. 101. Price, bound, \$1.50.

The original German edition of this excellent work has been previously noticed by us in detail (see "Am. Jour. Phar.," 1883, p. 56), and the hope then expressed that this monograph might be made accessible to those who are not familiar with the German language, has been realized. In undertaking this labor of love, Professor Power has rendered a signal service to the students of materia medica. Having previously spoken of the merits of the work itself, it remains for us now to speak of the manner in which the translation has been performed, and we may express this by stating that it was done faithfully and by following the original as closely as pos-

sible. The additions made by Professor Power are in Section xiv, on the quantitative examination of the alkaloids, in which Professor Flückiger's method of assay has been given more in detail and supplemented by an illustration of the apparatus serviceable for the purpose. In addition to this Dr. Squibb's process has been rendered so as to comprise the improvements recently made by its author, and the U. S. Pharmacopœia process for assay, which is that of Professor De Vrij, has been likewise embodied, together with his estimation of quinine. When we also state that the excellent plates of the original work have been specially imported for this edition, that new observations and investigations made on the cinchonas since the publication of the German work, have been embodied in this edition, and that the publishers have done ample justice to the character and importance of the monograph, it will be seen that those interested in the study of cinchona barks may be congratulated in having made a work of this kind accessible to them, and this at a cost which is only about one-half that at which the original can be imported, since through the liberality of the German publishing house the plates were obtained without necessitating the expense of making new engravings.

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*A Companion to the United States Pharmacopœia*; being a Commentary on the latest edition of the Pharmacopœia and containing the descriptions, properties, uses and doses of all official and numerous unofficial drugs and preparations in current use in the United States, together with practical hints, working formulas, etc., designed as a ready reference book for Pharmacists, Physicians and Students. With over 650 original illustrations. By Oscar Oldberg, Phar. D., member of the Committee of Revision, etc., and Otto A. Wall, M. D., Ph.G., Professor of Materia Medica, Therapeutics and Pharmacy in the Missouri Medical College, etc. New York: Wm. Wood & Co., 1844. 8vo, pp. 1,216. Price, muslin binding, \$6.75.

A work intended as a companion to the Pharmacopœia if prepared with proper care, should be practical and concise, and such a work is presented in the volume now before us. To give an idea of its aims and objects, it is necessary to first explain the manner of its arrangement. It would, naturally be expected that the arrangement should be such as to require the use of the index as little as possible, and that the position of each article in common use should be easily determined by those who are likely to consult the book. This has been accomplished in the following manner: The crude drugs and the chemicals follow one another in alphabetical order, the nomenclature being that adopted by the U. S. Pharmacopœia, or for the non-pharmacopœial articles, modelled in accordance with this national authority. All these are indicated by broad-faced type, which is readily distinguished at a glance from the rest; the various preparations made of each drug are then arranged again in alphabetical order without regard to whether they have found a place in the pharmacopœia or not. By transposing the names of these preparations as commonly written, the alphabetical arrangement of the whole work remains nearly undisturbed. For instance, under the drug Opium about thirty preparations are considered under the titles of opii acetum, opii acetum crocatum, opii confectio, opii emplastrum, opii enema, opii et camphoræ pilule, etc., closing with opii tinctura pectoralis, opii vinum and opium denarcotisatum. It will be



readily understood that this plan has its decided advantages for the physician, enabling him to consult in one place all that relates to one drug; and while we appreciate the arguments that have been, and may be advanced, from the position of a pharmacist, in favor of such an arrangement, we confess our preference for that of the Pharmacopœia, which brings at least the *preparations* together in classes, and affords an opportunity of giving instructions as to the mode of preparation, preservation, etc., applicable to all. Such instructions are given, together with other practical and critical remarks, under the heads of Emulsiones, Extracta, Liquores, etc.

The drugs proper are treated of as follows: 1. Origin, giving the botanical name and natural order of the plant; 2. Habitat, giving the name of the country, or continent where indigenous; 3. Parts used, mentioning root, rhizome, etc., as the case may be; 4. Description, omitted for pharmacopœial drugs, but reference is made to the page of the Pharmacopœia, occasionally with brief, pertinent remarks, or in the case of cinchona, opium and similar important drugs, with more extended general remarks. These are followed, if required, by a list and characters of the commercial varieties, brief directions for the application of tests, and by an enumeration of the medicinally valuable or pharmaceutically important principles. Each article usually closes with an account of the medical uses and the dose.

Non-pharmacopœial drugs are considered in precisely the same manner, except that a brief description of the characteristic appearance is given similar to those of the Pharmacopœia. For chemicals the first three sub-headings mentioned above are necessarily omitted, and as in the Pharmacopœia, no process for preparing them is given; but for non-pharmacopœial chemicals which may readily be prepared by the pharmacist, a more or less detailed process has generally been given.

The formulas for pharmacopœial preparations are in many cases given only so far as is necessary to render the "parts" as given in the Pharmacopœia, in definite weights convenient for use; but for non-pharmacopœial preparations convenient working formulas are given. Since these preparations always follow the drug, remarks on the medical uses are unnecessary; but the dose is given for each both in metric and apothecaries' weight or measure.

Concerning the scope of the work, it may be briefly said that not only the drugs and preparations of the Pharmacopœia, but also those in current use are considered in the manner indicated; and from what has been stated above, it is obvious that the practical usefulness of the book, to the pharmacist in his laboratory, along side of the Pharmacopœia, and to the physician for rapid consultation, is its prominent feature. Concerning the value of the latter purpose, we cannot offer an opinion; but in regard to the former it will be found to be a valuable "companion" as outlined above, and in the numerous practical hints and critical remarks, as well as in most of the 547 wood cuts, representing drugs and their anatomical structure.

The last 100 pages preceding the index are devoted to instructions in the practical use of the microscope, to the microscopical structure of plants, to the administration of medicines, extemporaneous prescriptions, signs, abbreviations, doses, measures, weights, etc.

*Elements of Pharmacy, Materia Medica and Therapeutics.* By William Whitla, M. D. (Q. U. I.), etc. With lithographs and wood cuts. Second edition. London: Henry Renshaw, 1884. 12mo, pp. 602. Price 10s. 6d.

This is a work intended for the medical student, and for the use of physicians who may be required to prepare medicines, rather than for that of the pharmacist; yet even the latter may find useful and practical hints in the first 100 pages, which are devoted to pharmacy, and give explanations in regard to the various pharmaceutical manipulations, utensils and preparations, and suggestions concerning difficulties to be more or less frequently met with in dispensing. Part II., occupying 124 pages, contains an alphabetical list of the drugs and chemicals of the British Pharmacopœia, and with each the preparations into which it enters. In each case a few descriptive words are added, which, though insufficient to fully characterize the article, serve to point out some of the leading physical properties; brief outlines of chemical processes are given, together with the dose and the strength of each preparation. Part III. is devoted to the therapeutics of the medicines enumerated before; and Part IV. to non-pharmacopœial remedies, the arrangement in both cases being alphabetical. Part V. treats of the administration of medicines, including the writing of prescriptions and giving several autograph prescriptions, with translations into unabbreviated Latin and English. Part VI. gives the principal tests of identity and purity of the more important remedies, tables of weight and measures, and of poisons and their antidotes.

The work, it will be observed, covers an extensive ground, and the information conveyed must necessarily be brief and often fragmentary in that portion of it in which the pharmacist is specially interested; yet we believe that it serves a very useful purpose in the hands of those for whose information it was written.

*Review of the Drug Trade of New York for the Year 1883.* Prepared by D. C. Robbins, Esq., for the Twenty-sixth Annual Report of the Chamber of Commerce of the State of New York.

Commercial statistics, if carefully collected, are of undoubted value. In noticing previous reports by Mr. Robbins, we have occasionally pointed out the fact that certain chemicals, which are extensively used and which were formerly largely imported, are now exclusively, or nearly so, manufactured in the United States for home consumption; we have also occasionally referred to the increase or decrease in the importation of certain drugs. We now take from the report the following figures, showing the importation of

	Cinchona.	Quinine.	Opium.	Opium, for smoking.
In 1878.....	4,826,290 lbs.	17,594 oz.	207,752 lbs.	54,805 lbs.
In 1883 .....	3,639,315 lbs.	1,055,764 oz.	229,012 lbs.	298,153 lbs.

The amounts imported of the second and fourth articles have steadily increased during the six years, while the importation of opium has fluctuated very little, exceeding the last amount in two years by 14,000 and nearly 50,000 lbs., and reaching 385,060 lbs. in 1881. On the other hand, the importation of cinchona bark reached its maximum in 1879, with 6,389,378 lbs., and has rapidly fallen off after 1880. We believe that these figures furnish material for reflection.

*Die Pflanzenstoffe in chemischer, physiologischer, pharmakologischer und toxikologischer Hinsicht.* Für Aerzte, Apotheker, Chemiker und Pharmakologen, bearbeitet von Dr. Aug. Husemann, Prof. Dr. A. Hilger und Prof. Dr. Th. Husemann. Zweite völlig umgearbeitete Auflage. In zwei Bänden. Berlin: Julius Springer, 1884. Vierte Lieferung. Svo, pp. 985 to 1571.

The Vegetable Compounds in their Chemical, Physiological, Pharmacological and Toxicological Relations. For Physicians, Apothecaries, Chemists and Pharmacologists. Second edition, rewritten. Part fourth. Price 12 marks.

The part now before us concludes a work which in its first edition already attracted the attention of those for whose use it was prepared, and which in its present shape will sustain the reputation it acquired when it made its first appearance more than ten years ago. In noticing the preceding three parts, we have already pointed out the general arrangement of the vast amount of material on hand, and the manner in which each compound is considered, according to its importance. The medicinally most important natural orders of the present part are: Thymelacæe, Rosacæe, Leguminosæ, Ericacæe, Convolvulacæe, Solanacæe, Labiatæ, Oleacæe, Gentianacæe, Loganiacæe, Apocynacæe, Lobeliacæe, Cucurbitacæe, Rubiacæe and Compositæ. Many drugs of more or less importance are procured from these orders; and, aside from the volatile oils, many of these yield proximate principles which are either in common use, like the cinchona and strychnos alkaloids, salicylic acid, the resins of jalap and scammony, etc., or give promise of greater usefulness in the future, like those of the Solanacæe, Apocynacæe, etc. After carefully examining the last part, and comparing it with the preceding ones, we feel justified in saying for the completed work what we stated on the appearance of the first three parts, that it shows a most careful compilation of the vast material which has accumulated in the course of time, critical sifting of sometimes conflicting statements, and excellent judgment in giving due prominence to those principles which are of real importance. While we should have liked to see more extended notices of several articles, we cannot but admit that, no matter what special interest may attach to them, these are as yet of no, or but limited, importance considering the scope of the work.

That the publisher has done his part equally well we have said on previous occasions.

*Consultation Chart of the Eye-symptoms and Eye-complications of General Diseases.* Arranged after Foerster and others by Henry G. Cornwell, M. D., Clinical Lecturer on Ophthalmology and Otology, Starling Medical College. Columbus, Ohio: H. C. McClelland & Co. Price 25 cents.

*Alchemical Notation.* Compiled from a paper read by Prof. H. Carrington Bolton before the New York Academy of Sciences. New York: Waring & Williams. Price 20 cents.

This chart will doubtless be of interest to students of chemistry in general, and specially to physicians and pharmacists, since it contains those signs which are occasionally seen in old-fashioned prescriptions. That portion of the chart containing the "Chymical, etc., characters" might be somewhat clearer.

# THE AMERICAN JOURNAL OF PHARMACY.

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JUNE, 1884.

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## ON MALT AND MALTING.

BY FRANK XAVIER MOERK, PH.G.

*From an Inaugural Essay.*<sup>1</sup>

Malt is described by the Pharmacopœia as "the seed of *Hordeum distichum* caused to enter the incipient state of germination by artificial means, and dried."

The process which the barley undergoes is termed "malting," and has for its object the production of soluble albuminoids, diastase, from the insoluble albuminous bodies present. These albuminoids possess the property of converting, under suitable circumstances, the starch of the grain into maltose, a fermentable sugar, and dextrin, a body closely related thereto. The formation of diastase proceeds first in the same proportion as the development of the embryo, but after the young plant has arrived at a stage when respiration through the plumula and assimilation through the rootlets can take place, the amount of diastase stored up in the grain gradually decreases. It is, therefore, the aim of the malster to arrest the growth of the germ at the moment when most diastase is accumulated in the grain, *i. e.*, before the future stem surpasses the length of the grain. This is accomplished by killing the embryo by drying and heating.

Malting consists of four operations: Steeping, Couching, Flooring, and Kiln-drying.

I. *Steeping*.—The barley is screened and sifted to remove broken or small grains, it is then let into a large cistern made of stone, iron, cement or wood. The water, temperature 10–13° C. (50–55° F.), is then added and allowed to cover the grain to a depth of 4 or 5 inches. The time required to steep the barley is about three days; the water

<sup>1</sup> Mr. Moerk's thesis, presented to the Philadelphia College of Pharmacy, contains interesting investigations on barley and malt, but being quite voluminous, we deem it best to publish separately the different subdivisions or portions thereof.—EDITOR.



is occasionally replaced by fresh water, in order to prevent putrefaction of the extracted matter.

II. *Couching*.—The barley, before it is thoroughly saturated, is thrown out of the cistern and put in large heaps on the couch. On thrusting the hand into the heap at the end of 24 hours, the length of time it is allowed to remain there, it does not feel moist. The grain, by this operation, has the benefit of a secondary steep with free access of air, the water adhering to the grain is mostly absorbed. The grain, when saturated, appears soft and flexible, and the husk will easily separate from the body, the latter, on pressing, becomes pulpy. The most characteristic indication of the penetration of the water is the appearance of a longitudinally split grain, the starchy body of which should be smooth and oily looking. The changes taking place while in the steep are as follows: Barley gains from 40 to 50 per cent. in weight and increases about 25 per cent. in bulk. About  $1\frac{1}{2}$  per cent. is extracted, of which two-thirds is organic and one-third inorganic matter.

III. *Flooring*.—The barley is now thrown upon the floor to a depth of about 12 inches. The conditions required for a healthy germination are 1, the grain should have absorbed sufficient water while in the steep; 2, the steeped grain should be supplied with plenty fresh air; and 3, a certain, although only slight, amount of heat is required to introduce the activity of life into the grain. The first condition has been complied with in the previous operations. The second is fulfilled by turning the grain so that the portions in the centre and at the bottom are brought toward the top of the heap. This turning is made only once or twice a day for the first few days, but requires to be done oftener after the grain commences to germinate. The third condition is carried out by placing the grain to a considerable depth—12 inches—on the floor; by doing this, heat is generated after a time. The conditions having been complied with, oxygen is rapidly absorbed, and, in combining with part of the substance of the grain to form water and carbon dioxide, heat is generated which stimulates the growth of the young plant, after a time, to such an extent that the rise of the temperature in the mass of the growing grain must be checked. This is done by frequently turning the grain and laying it thinner every time it is turned. At the end of the fifth or sixth day, the grain covers the floor to a depth of 3 or 4 inches, and, as the grain then grows very slowly, it is necessary to stimulate the growth by grad-

ually increasing the depth, so that at the end of this operation, the depth is about 9 inches. Very little change is noticed in the barley until it has been about three days on the floor. On thrusting the hand into the heap at this time, it feels moist. This is called "sweating" by the malster, and here germination commences. The grain is allowed to remain on the floor until the acrospire, plumula, creeping along under the husk *almost* reaches the other end of the grain; if allowed to pass this, the diastase rapidly disappears. This is the best indication of the progress made during flooring, and corresponds with the increase of diastase. The time required for this operation varies from 8 to 12 days. The best temperature is 10–13° C. (50–55° F.); if the temperature exceeds 15° C., it does not take so long a time, but there is a greater loss of substance. This loss, by oxidation, at 10–13° C., amounts to 5 or 6 per cent., whilst with a higher temperature it amounts to as much as 15 per cent. In this operation is produced the diastase, and also a modification of the starch, so that it is readily acted upon by diastase.

IV. *Kiln-drying*.—The further growth of the grain is now stopped by drying it at a temperature varying from 32–71° C. (90–160° F.). It is placed, to a depth of from 6 to 9 inches, on a perforated iron floor and heated air caused to pass through it. A temperature of 32° C. (90° F.) is most approved of to get rid of the greater part of the moisture; 52–57° C. (125–135° F.) for gradually drying the malt; and, 65–71° C. (150–160° F.) to produce an aromatic flavor and reduce the moisture to from 2 to 1½ per cent. By using still higher heats, the variously colored malts are produced. In consequence of the last operation the malt combs, rootlets, become very brittle and are easily removed by sifting.

The loss in malting may be summed up as follows :

In steep.....	1·5 per cent.
Flooring.....	5· to 6· per cent.
Rootlets.....	2·5 to 3· per cent.
Total.....	9 to 10·5 per cent.

The above description is taken from "Steiner's Principles of Malting," corrected by Mr. T. M. Perot, so as to agree with the preparation of malt at his malt house.

Barley and malt have been the subjects of many analyses; but the results differed in nearly every one. The presence or absence of sugar

and dextrin, one or both, were the points to which these differences were due. Mr. G. Kühnemann, in 1875, was the first chemist to prove that cane-sugar was present in barley and malt, the latter also containing another sugar capable of reducing Fehling's solution. On the other hand, he denied the presence of dextrin, this owing to his belief that dextrin reduced Fehling's solution. Researches made within the last few years, prove that dextrin, if pure, will not reduce the test solution, but commercial dextrin invariably reduces it, owing to the presence of more or less glucose. By repeatedly dissolving dextrin in water, precipitating by and washing with alcohol, glucose can be separated from the dextrin, and the latter will then not reduce Fehling's solution.

## MICROSCOPICAL EXAMINATION OF MALT.

BY GRACE LEE BABB, PH.G.

*From an Inaugural Essay.*

The process of malting barley is very simple in theory, but in practice requires a great deal of care, and constant attention. The barley must be carefully selected—this is the work of an expert—and then “steeped.” For this purpose it is placed in wooden vats, covered with cold water, and allowed to stand several days. Some maltsters consider this operation complete when the grain is soft enough to be pierced by a needle; others, when it can be crushed between the fingers. The operation is carried too far when the contents of the vats become milky. During this time the barley absorbs from 50 to 60 per cent. of water, which is necessary in the following operations. The unabsorbed water is then drawn off from the vats, and the softened barley is placed in couches upon the floor of the malting house. Germination now begins; the radicles appear, and the acrospires develop; at the same time moisture is given off; hence this stage of the operation is sometimes called the “sweating.” Were this allowed to proceed the albumen of the seed would be used for the development of the radicles and plumules, and the desired object—the conversion of the starch into maltose, or sugar—would be lost. To prevent further development the temperature is reduced by spreading out the couches, repeatedly turning, and scattering over a constantly increasing surface. When the process has been carried as far as desired, which is generally considered to be when the acrospire has grown to

two-thirds the length of the grain, it is stopped completely by kiln-drying. This is done in a large room with a brick or tile floor which is heated by steam. Here the barley is finished by being perfectly dried, and this product constitutes the officinal malt.

Much depends upon the temperature used in this last operation; if the heat is sufficient to scorch it, it is ruined as malt, but is used for coloring porter, etc. When the temperature varies from  $90^{\circ}$  to  $100^{\circ}$  F., pale malt results; this is the kind required by the Pharmacopœia.

The barley grain is elliptical in shape; its principal part is the farinaceous matter, as the embryo occupies but a small indenture at one end and on the outside. On the opposite side from the embryo, running lengthwise, is a gradually broadening groove. Closely adhering to the endosperm is the pericarp, and outside of this is the so-called husk. Both the pericarp and the husk are smooth and continuous over the embryo, and terminate in the groove.

A transverse section through the barley grain shows the thin-walled parenchyma radiating from the groove, and on the outer edge two or three rows of gluten cells: beyond these are the tabulated cells of the husk, in which is deposited a large amount of silica: between these is seen a brown line of indefinite structure, which forms the pericarp. The gluten cells extend around the grain, but as the pericarp descends into the groove they are obliterated.

The simple theory of malting is that in the presence of moisture absorbed during the steeping operation, and with a certain amount of heat, the diastase which is developed during germination converts the starch into a fermentable sugar called maltose. As the malting process advances, the proportion of starch diminishes, while that of the sugar increases. It was thought that it might be possible to study this change of starch into sugar microscopically, not expecting that the sugar could be distinguished under the microscope, but that the disappearance of the starch granules could be gradually traced, and the indications thus gained would be of practical service by definitely settling the period of time necessary for the transformation of the starch.

With the hope of determining when there was the greatest change in number and appearance of the starch granules, transverse sections of the barley grain have been made, and also of the barley in its different stages of malting, from the steeped down through the series, even including that which had been exposed ten days. The following results have been obtained: The starch granules of the barley vary in



size and shape; some of them are very minute and globular, while others are much larger and have much the same elliptical shape as the barley grain itself. A line which resembles the groove in the barley grain extends the entire length of the starch granule.

The greatest change seems to take place in the minute globular starch granules, as on the tenth day these have to a great extent disappeared, and in some specimens are entirely wanting. On the tenth day there are still found some of the larger elliptical starch granules, and, although their number has decreased, the relative size of the residue has apparently increased. The radiating structure which has already been mentioned as being characteristic of the barley grain is not as distinct in the steeped grain, and can with difficulty be traced in the first day. In these two the starch granules do not appear to be materially changed. In the third day malt the whole structure of the barley grain seems to be expanded; the smaller starch granules become more scattered, and an increase in the size of the elliptical starch granules is noticed. This latter change gradually increases in the fourth, fifth and sixth days' malt, being greatest along the groove, and thence radiating out towards the margin. In the seventh day malt there seems to be the greatest change; the elliptical granules are still observed to be larger, but are now very few in number. The appearance of the eighth and ninth days' malt is not essentially different from that of the seventh day's malt. In the tenth day malt the majority of the grains show a very few elliptical shaped starch granules, and the smaller granules are now replaced by globular masses, the nature of which has not been determined.

In conclusion, the results of the labor spent in this direction indicate that, with sufficient practical experience, the difference between malt which has been subjected to different degrees of exposure upon the floor could be readily detected. It is to be hoped that the subject of the microscopical determination of the value of malt may hereafter be carried out with valuable developments.

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**Imitation Maple Sugar.**—It is said that the flavor of maple syrup may be communicated to cane or glucose syrup by tincture of guaiacum deprived of its resin by precipitation in water. A great deal of the maple sugar and syrup now sold is said to be nearly pure glucose prepared in this way.—*Popular Science News.*

# EXAMINATION OF GLYCYRRHIZA EXTRACTS.

BY LUTHER J. SCHROEDER, PH.G.

*Abstract from an Inaugural Essay.*

The author procured eight samples of liquorice, comprising the most prominent brands of foreign manufacture as well as several of American make. The examination was confined to the determination of matter insoluble in cold water, of glycyrrhizin soluble in water and of glycyrrhizin soluble in ammonia. 500 grains of (air-dry?) extract of glycyrrhiza were macerated in 12 fluidounces of cold water for 24 hours, the mixture was transferred to a filter, and the insoluble matter well washed until the filtrate passed colorless, dried (at what temperature?) and weighed. The residue of No. 1 was lightest in color and very smooth; 5 and 6 were somewhat darker and the others were much darker and gritty. The filtrates (diluted to a uniform amount?) likewise varied much in color and taste, those from 1, 5 and 6 being dark colored and of a fine flavor, and the remainder lighter colored and less pleasant; that from 8 had a peculiar acid taste. These filtrates (without further concentration?) were precipitated with diluted sulphuric acid, the precipitates collected upon a filter, washed with acidulated water, redissolved in ammonia and reprecipitated by sulphuric acid, this operation being repeated several times; the precipitate was finally washed and dried.

The portion insoluble in cold water was treated with diluted ammonia, the filtrate precipitated by diluted acid, and the precipitate purified by redissolving and reprecipitating several times, taking care to frequently filter to take out impurities (?). The results are tabulated as follows, 500 grains being used in each case:

Brand.	Residue.		Glycyrrhizin.		
	Weight.	Per cent.	Soluble.	Insoluble.	Total.
	Grains.				Grains.
1. M. & R.	180	36	38	5	43
2. Y. & S.	174	34.8	30	10	40
3. Dean.	239	47.8	8	5	13
4. Royal.	274	54.8	6	3	9
5. Corigliano	150	30	15	15	30
6. Guzzolini.	132	26.4	10	7	17
7. P. & S.	125	25	10	11	21
8. S. C.	130	26	.....	13	13

## REMARKS ON GLYCYRRHIZA EXTRACTS.

BY THE EDITOR.

The results obtained by Mr. Schroeder, as given in the preceding paper, although absolute correctness is not claimed for them, nevertheless appear to possess considerable pharmaceutical interest. Since uncombined glycyrrhizin is sparingly soluble, not entirely insoluble, in cold water and dissolves freely in boiling water, it is evident that the loss of this compound has been the greater the more frequently purification was attempted by re-solution in ammonia and reprecipitation by acid. Sestini in 1878 showed that fresh liquorice root containing 48·7 per cent. of moisture yielded 3·27 per cent. of glycyrrhizin, which is equal to 6·37 per cent. for the dry root. Delondre in 1856 obtained from liquorice root by successive treatment with cold water, boiling water and steam, 15, 7·5 and 16, or a total of 38·5 per cent. of extract, which, if all the glycyrrhizin is present, would contain about 16·5 per cent. of this compound. The largest amount obtained by Mr. Schroeder's process was 8·6 per cent. A portion of this deficiency is due to the water present in the commercial extract, which Madsen (*"Am. Jour. Phar.,"* 1882, p. 7) found to vary between 10·5 and 16·5 per cent.

That different lots of the same brand of liquorice vary to some extent has been repeatedly shown. Mr. Madsen in examining six samples of "Baracco" liquorice (air dry) found the matter insoluble in cold water to vary between 21·1 and 37·5 per cent.; extract soluble in water and reprecipitated by alcohol, 26·65 to 45·60; ash, 6·06 to 14·23; sugar, 7·33 to 15·17, and arabin, 1·52 to 10·49 per cent. Determinations of insoluble matter in liquorice were made by W. N. Martindell (*"Am. Jour. Phar.,"* 1873, p. 151); the figures obtained by him for 500 grains of commercial extracts, as compared with Mr. Schroeder's results, are as follows:

Corigliano.....	218 gr. M., 150 gr. S. ;	P. & S.....	248 gr. M., 125 gr. S. ;
Guzzolini.....	175 gr. M., 132 gr. S. ;	M. & R.....	116 gr. M., 180 gr. S.

The U. S. Pharmacopeia requires that not less than 60 per cent. of the extract should be soluble in cold water. The water naturally present in the extract is obviously included in the soluble matter. The German Pharmacopeia states that 700 parts of the extract, dried at 100°C., must leave a residue weighing at least 83 parts (= not over

17 per cent. of moisture); and when the air dry extract is exhausted with water of not more than  $50^{\circ}\text{C}$ ., the insoluble residue, after being dried in the water-bath, should not exceed 25 per cent. Calculated for the dried extract, the limit of insoluble matter is 30 per cent., and the requirement of the U. S. Pharmacopœia should likewise be interpreted as being for the extract dried at  $100^{\circ}\text{C}$ . But if it be conceded that the pharmaceutical and perhaps also the medicinal value of extract of liquorice depends upon the glycyrrhizin, the percentage of soluble matter alone can give no indication of the correct value; and a process for accurately estimating the glycyrrhizin is still unknown.

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## TASTELESS AND ODORLESS SOLUTION OF AMMONIUM VALERATE.

BY R. ROTHER.

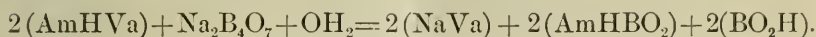
The sharp, unpalatable flavor and repulsive odor of ammonium valerate have not greatly diminished its rather extensive application. This fact certainly indicates that the compound is possessed of some peculiar merit. Now, if by some simple and legitimate means, these objectionable features could be repressed, or favorably modified, a much higher degree of usefulness might be expected. An elixir has thus far been the most agreeable form of administration. But it is scarcely necessary to remark that the powerful and persistent repugnant qualities have yielded to but little if any modification.

It has been customary to exhibit the salt in a slightly alkaline form of solution. Some elixirs of this salt are, however, to be found having a very decided acid reaction. Formerly, when solutions of ammonium valerate were prepared from valeric acid and ammonium carbonate, neutral and slightly alkaline solutions were, as a consequence, more in vogue than now. At present, the elixir is almost exclusively made from the crystallized salt. When these crystals are mixed with water, they form, to a large extent, an oily layer which floats on the surface of the mixture, but subsequently dissolves on the addition of the alcohol. In explanation of this result it was stated that water decomposes the crystallized salt into valeric acid and free ammonia. To obviate this effect the salt was directed to be dissolved in the alcohol first, as then the subsequent admixture of water would not effect its decomposition. The truth, however, is that the crystals are in the main an



acid valerate similar to the acid acetate of ammonium. When the acid valerate is mixed with a moderate amount of water, the normal salt dissolves, whilst the less soluble valeric acid rises to the surface. The addition of a requisite amount of ammonia dissolves the stratum of valeric acid, and thus all the salt is made normal and in permanent solution. Admixture of simple elixir, colored or not, with this solution produces an elixir of the normal valerate uncontaminated by free valeric acid. A solution of the acid valerate fumes in the presence of gaseous ammonia, showing thereby that at ordinary temperatures the valeric acid volatilizes first. From this the writer concluded that the normal salt is not volatile, and that the obnoxious odor is due to the dissipation of free valeric acid. In order to find some expedient which could obviate this change in binding the incipient acid more firmly, a little borax was added to a slightly alkaline elixir of the valerate, colored pretty deeply with simple tincture of cochineal. The immediate effect was a change of the color to a light scarlet, indicating an acid reaction. More borax was then gradually added until this largely predominated, but the new tint remained unaffected. The sharp taste of the elixir had now entirely disappeared, and the repulsive odor was barely perceptible. In consideration of this result, crystallized ammonium valerate was mixed with four times its weight of water, then neutralized with ammonia, and the clear solution treated with borax by gradual addition. The borax was greedily absorbed, but after a certain amount of it had been added, a crystalline precipitate of a new salt began to form abundantly, even during the further incorporation of the borax. On diluting this mixture with twice its volume of water, it became clear immediately. The reaction of the mixture became acid after the first small addition of borax, and retained this condition even in the presence of excess of borax. After one molecule of borax had been consumed by two *ms.* of the ammonium valerate, the peculiar and unpleasant valeric odor had practically vanished, and the taste of the solution had wholly lost its sharpness and valeric character. It was now pleasantly sweet, with a tinge of saline. By spontaneous evaporation, tolerably large, apparently octahedral, crystals were deposited, but when the solution was condensed by gently warming a different and more confused form of crystals appeared. All these crystals had a very mild saline taste, and yielded ammonia profusely on treatment with potash solution. These results indicate that sodium valerate,

ammonium metaborate and free metaboric acid are formed according to the following equation :



This new form of valerate, aside from its pleasant flavor and odorless character, must also possess superior medicinal qualities. In the first place, the sodium valerate, by retaining the acid more firmly in combination, would seem to aid its absorption and consequent efficiency. In the second place, the ammonium metaborate simultaneously transmits and yields its base in a more prompt and effective manner. In the third place, the boric radicle is itself possessed of just such medicinal qualities as would render it a desirable adjunct. The palatable and acceptable nature of the solution dispenses with the usual adjuvants of the ordinary valerate, and hence the writer proposes a simple aqueous solution in place of the elixir and other forms. This solution, as above already stated, is practically odorless ; that is, it is free from the persistent objectionable valeric rankness. This does not imply its being absolutely odorless, however. On drying along the walls of the containing vessel, as also around the mouths of the bottles, a very mild reminder of the former taint adheres, whilst in the body of the solution it cannot be perceived. Receptacles having contained the solution are readily and perfectly cleansed by simply rinsing with water. The older forms of the valerate were characterized by the nearly irremovable nature of the odor. The new solution represents about two grains of the normal ammonium valerate in the fluidrachm, and is prepared as follows :

Ammonium valerate cryst.....119 grains.  
Borax .....191 grains.  
Water of ammonia.  
Distilled water, of each sufficient.

Mix the valerate with one fluidounce of distilled water, and add water of ammonia, drop by drop, until a clear and slightly alkaline solution is produced. Then add two fluidounces of distilled water and the previously powdered borax, and when all has dissolved, excepting a few contaminating crystals of calcium borate, add distilled water to the measure of eight fluidounces, and filter the solution.

## THE ASSAY OF CITRATE OF IRON AND QUININE.

BY JOHN CHALES FALK, PH.G.

*From an Inaugural Essay.*

The Pharmacopœia gives a process for assaying this salt which consists in precipitating the quinine with solution of soda from an aqueous solution of the scales, dissolving out the quinine with chloroform, separating the chloroform and evaporating to dryness. The weight of the residue is given as the proportion of quinine in the scales. In order to test the correctness of this process I first prepared some citrate of iron and quinine, carefully following the pharmacopœial proportions and directions, and then assayed it as follows:

Dissolve 4 Gm. of the salt in 30Ccm. of water, pour into the separator, add the rinsings of the capsule and 0.5 Gm. of tartaric acid, solution of soda in excess, then add successive portions of chloroform, and shake several minutes after each addition. Having allowed four portions each of 15Ccm. to run into a weighed beaker it was evaporated on the water-bath till of a constant weight, which was .560 Gm. A fifth portion of chloroform, evaporated separately, left a residue weighing .004 Gm. showing that practically all the quinine was removed from the solution. This gave then a total residue weighing .564 Gm. or .084 Gm. more than the amount of quinine in the 4 Gm. of scales. On repeating the assay the same result was obtained, and obviously this process was not to be depended upon for accurate results.

This residue was dissolved in a small amount of water with sulphuric acid, filtered and the filter washed with acidulated water till the filtrate ceased to be affected by solution of soda. The filtered solution was then treated with an excess of solution of soda, the precipitate collected on two balanced filters and washed with cold distilled water till the washings ceased to cloud with solution of chloride of barium. The filtrate and washings measured 65Ccm. The filters and contents were dried on the water bath till they ceased to lose weight. The weight of quinine thus obtained was .477 Gm. equal to 11.925 per cent., and it was almost pure white. The correctness of this result was verified by repeating the assay with the same scales.

Six samples of the salt were procured in Philadelphia and assayed for total alkaloids only, in precisely the same manner.

Sample No. 1 was obtained in the original bottle, and judging from its behavior was made very nearly in accordance with the Pharmacopœia. It contained no ammonia and dissolved slowly in cold water. Chloroform extracted ·557 Gm. of soluble matter, which after being treated as described, weighed ·470 Gm. or 11·25 per cent. of alkaloid. The only noticeable difference between this sample and the U. S. Pharmacopœia preparation was in the straw yellow color of the alkaloid.

No. 2, obtained in the original bottle, was in thin yellowish brown scales, which dissolved quickly in cold water, and on heating with potassa gave off ammonia. Chloroform left a residue of ·493 Gm. which after further treatment weighed ·385 Gm. or 9·625 per cent. This residue had a dark brown color, and was resinous in appearance and fracture.

No. 3 was obtained in bulk from a retail store. It contained ammonia, and in appearance resembled No. 2. The chloroform residue weighed ·515 Gm. and on treating this further yielded the alkaloid similar to that of No. 2 and weighing ·375 Gm. or 9·375 per cent.

No. 4 was also purchased from the shop bottle of a retail store. It contained ammonia, and like the two previous samples was in thin yellowish brown and easily soluble scales. Chloroform removed ·485 Gm. and the final residue weighed ·380 Gm. or 9·5 per cent. The alkaloid was dark brown and resinous.

No. 5, from an original bottle, was in very thin yellowish red, and very easily soluble scales containing ammonia. Chloroform extracted ·508 Gm. and the alkaloid obtained weighed ·410 Gm. or 10·25 per cent. This alkaloid was not as dark colored as Nos. 2, 3 and 4, but was resinous in fracture.

No. 6 was obtained in bulk, and like No. 5 was in very thin scales, and proved to be an ammonio citrate. The chloroformic residue weighed ·511 Gm. and this after the final treatment weighed ·385 Gm. which was 9·625 per cent.; it resembled that of No. 5.

It would appear from these results, that owing to the demand for an easily soluble salt, the manufacturers put chiefly an ammonio citrate on the market, as five out of six of my samples contained ammonia.

The final residue of alkaloids from these five samples were nearly of the same dark appearance, somewhat resembling chinoidin, and due probably to the use of unbleached or amorphous alkaloids in place of the pure, white quinine directed to be used in the Pharmacopœia. Neither of the samples left, on incinerating, an ash of an alkaline re-



action, showing the absence of fixed alkalies. Nor did any of them contain any appreciable amount of cinchonine, as was proven by the ready solubility of the alkaloids in definite weights of ether and alcohol.

Whilst assaying the scales containing ammonia, I noticed that four separations of chloroform of 15Ccm. each were not sufficient in some cases when five and even six such additions were necessary to thoroughly extract the alkaloids. It was also found necessary to increase the amount of tartaric acid to one gram, before precipitating with soda, for when iron is precipitated the clear separation of the chloroform is hindered very much.

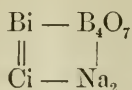
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### SODIO-BISMUTH CITROPYROBORATE.

BY R. ROTHER.

Most of the normal salts of bismuth are either insoluble in water or decomposed by it into insoluble bismuthyl or oxysalts and free acid. Certain bismuth and bismuthyl double salts of various organic acids are extremely soluble in water without decomposition. Alkalies in moderate excess do not disturb these solutions, but most acids destroy the soluble compound and precipitate insoluble normal salts of the organic acids. This behavior is a great obstacle to the formation of permanent acidulated solutions. The generality of galenical preparations of which bismuth is a component usually contain it as ammonio-citrate. The combinations are always permanent when alkaline or if acid when ferrated. All elixirs containing bismuth when in the least acidulated inevitably separate bismuth citrate in crystalline crusts on standing a short time. The peculiar and popular combinations of bismuth and pepsin when acid are sure to precipitate the bismuth salt and when alkaline to injure the pepsin. The writer in attempting to find a suitable compound of bismuth which could bear moderate acidulation and remain dissolved, believed that the sodio-bismuth pyrophosphate would be such a salt, and that it might admit of permanent association with pyrophosphoric acid. No success attending this experiment, the writer next resorted to a trial of various acids in connection with the prevalent bismuth ammonio-citrate. It was found that boric acid did not decompose this salt, and hence a desideratum is thus obtained in the stability of a solution containing free boric acid. This result led the writer to treat bismuth citrate with borax direct, thereby aiming at a similar and definite sodium compound. The

experiment showed that the two salts unite in the proportion of one m. of each. This indicates a secondary double salt constituted thus :



That is a sodio-bismuth citropyroborate. It is a remarkable point in the formation of this salt that the chemically and optically neutral bismuth citrate in combining with the chemically neutral but optically alkaline sodium pyroborate produces a chemically neutral but optically decidedly acid compound. This is a colorless amorphous, very soluble non-deliquescent salt. It is insoluble in alcohol but miscible with water in all large proportions without decomposition. It has a faint saline, slightly metallic but not unpleasant taste. The solution of this salt is not disturbed by the presence of neutral chlorides. Most acids excepting boric acid decompose it at once and precipitate a bulky and gelatinous compound of bismuth and boric acid. This precipitate is insoluble in a moderate excess of acid but dissolves readily in a solution of borax. In the presence of excess of borax no precipitate is formed by the usual acids unless these predominate ; citric acid, however, causes a separation of crystalline bismuth citrate.

When the solution of the salt is evaporated to a thin syrupy consistence it becomes slightly turbid on cooling and deposits a large amount of colorless crystals. On spontaneous evaporation the remaining solution yields a considerable quantity of small white crystal. By adding water to the whole residue the colorless crystals rapidly disintegrate and an augmentation of the white crystals occurs. The application of heat in the presence of this small quantity of water does not reproduce the clear solution. But the addition of water in about five times the weight of the residue and subsequent heating promptly effects a clear solution by a reconstitution of the original salt. When, however, the solution of the salt is evaporated at a uniform temperature to a dense syrupy consistence an amorphous beautiful sealed residue remains which resembles in appearance the official ammonia-citrate of bismuth. A small quantity of water again decomposes it into its primary factors, the bismuth citrate and sodium pyroborate. The former appears as white, insoluble crystals, whilst the latter is readily recognized by its taste. It appears therefore that the new salt is a sealed amorphous compound which is permanent in the absence of water and equally permanent in any large proportion of water, but is

readily and completely decomposed by a comparatively small quantity of water. In its production in the solid form some care is necessary, during the later stage of the evaporation, not to let the temperature sink, as this partial cooling in contact with the modicum of water causes a decomposition and consequent turbidity which subsequent heating does not correct.

The following formula yields it with the greatest ease:

Bismuth citrate.....	399 parts.
Sodium pyroborate, in powder .....	382 "
Water sufficient.	

Mix the citrate and borax with 2,400 parts of water and apply heat until the citrate is all dissolved. Then filter the solution after having diluted it with its volume of water and evaporate it at a uniform temperature to a dense syrupy consistence and spread it on plates of glass or porcelain so that on cooling the salt may be obtained in scales.

The writer has made no decisive experiments in relation to the action of this salt on solutions of pepsin. When a solution of pepsin prepared with chlorhydric acid is first carefully neutralized with sodium bicarbonate or treated with a slight excess of borax the bismuth solution produces a faint flocculent precipitate, not however proportionate to the amount of pepsin present. The character of the precipitate was not ascertained. Bismuth citrate also forms a soluble combination with sodium pyrophosphate, but the writer has not further examined it.

In conclusion it may be said that when borax is heated with bismuthyl nitrate decomposition ensues, but the resulting compound is insoluble in excess of borax. This shows that a sodio-bismuth pyroborate cannot be formed. Some time since the writer attempted to prepare bismuth salicylate by heating bismuthyl nitrate with sodium salicylate. Perfect decomposition could not be attained, and the writer then heated the nitrate with salicylic acid. A very surprising result followed this experiment. Combination speedily occurred and a readily fusible brown-red crystalline mass was formed. Stronger acids liberated from this a brown-red, peculiarly odorous acid which, without further examination, appeared to be one or more of the three nitro-salicylic acids. This result is in so far remarkable that it easily effects the generation of nitro-acids which ordinarily can only be produced by the direct intervention of very concentrated nitric acid at a high heat.

## DETECTION OF CHLORINE, BROMINE, AND IODINE.<sup>1</sup>

BY C. THOMPSON.

In the "Chemical News" (vol. xlviii, p. 296) there appeared a process by Mr. Jones, for detecting chlorine, bromine and iodine in the presence of each other. The process was as follows: "Place a small quantity of the mixture to be tested in a good sized test-tube, add a few pieces of manganese dioxide and then a little water. Add now 1 drop of dilute sulphuric acid (1 part acid to 10 parts of water), a brown tinge indicates the presence of iodine. Boil the mixture and confirm the presence of iodine by the violet vapors in the upper part of the tube. Continue the boiling till these vapors cease to appear, then add another drop of sulphuric acid and boil again until they cease. If necessary, repeat this addition of acid and boiling until violet vapors have entirely ceased. Now add about 2 cubic centimeters of the dilute acid and boil again; brown vapors indicate bromine. Continue the boiling until the vapors no longer smell of bromine, then add another cubic centimeter of dilute acid and boil again. When the vapors no longer smell of bromine, allow the tube to cool thoroughly, add an equal bulk of strong sulphuric acid and warm; a green gas bleaching a piece of moist red blotting-paper at the mouth of the tube indicates chlorine. Occasionally some more bromine comes off on the addition of the strong sulphuric acid, but if so, it is soon got rid of and is succeeded by the chlorine, which is chiefly evolved on heating the mixture. As, moreover, red blotting-paper is far more quickly acted on by chlorine than by bromine there can be no difficulty in distinguishing between the two." Mr. Jones also adds that he has found this process to compare very favorably with others. This process is somewhat similar to that recommended by Vortmann, except that sulphuric acid is the active agent instead of acetic acid. Mr. Barnes has shown that unless very great care is exercised, Vortmann's process is not trustworthy; so that it would not at first sight seem likely that Mr. Jones's process in which sulphuric acid is to be used would answer much better.

Experiments tend to confirm this statement. If there be a large

<sup>1</sup> Report on Analytical Chemistry read before the School of Pharmacy Students' Association.



excess of iodide over that of the bromide present in the solution or mixture to be tested, or if, *vice versâ*, the bromide be in excess, then this result seems to follow in nearly every instance; viz., that the vapor of that halogen which is present in a very small quantity relatively to the quantity present of the other halogen is likely to be overpowered by the vapor of the latter. When relying only on the color of the vapor it was found that when the proportion of the iodine to the bromide was less than 1 to 14, the iodine could not be detected, and even when paper moistened with starch solution was used, there was no indication of iodine if the proportion was less than 1 to 20. As regards detecting bromine, following the process, and relying on the color of the vapor only, it was found that the bromine could not be detected if the proportion between the bromide and iodide present was less than 1 to 15; when filter-paper moistened with iodide of potassium and starch solution was used, it was possible to detect the bromine so long as the proportion between the bromide and the iodide is not less than 1 to 22.

When the chloride is present in small quantities relatively to the iodide and bromide, or more especially if it be the bromide which is in excess, it is not easy to detect it by this method; for when the bromide is in large excess it is not all driven off by the addition of the dilute sulphuric acid, so that when the strong acid is added the remainder comes off and takes along with it the chlorine.

As a rough way of detecting the presence of either one or of all three of the halogens, when present in fair quantity relatively, this process will answer, more especially if the color of the vapor be not alone relied on, but filter paper moistened with starch solution for the iodine and with iodide of potassium and starch solution for the bromine be used.

As a delicate test for detecting the presence of small quantities of either one of the three halogens in presence of the other two it is not to be relied on.—*Phar. Jour. Trans.*, May 3, 1884, p. 881.

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**Phenic Acid in Yellow Fever.**—Dr. de Lacaille, of Rio de Janeiro, professes to have cured thirty-eight consecutive cases of yellow fever by the use of Déclat's preparations of phenic and sulpho-phenic acids, and, in grave cases, the phenate of ammonium. In the early stages he gives the remedies by the mouth, but in the advanced stages the hypodermic method is necessary. He contrasts very favorably his recent experience with his former sad failures without these drugs.—*Med. and Surg. Rep.*, March 8.

## FERRIC ETHYLATE AND COLLOIDAL FERRIC HYDRATE.

BY E. GRIMAUX.

When 1 mol. of ferric chloride in alcoholic solution is mixed with 6 mols. of sodium ethylate, sodium chloride is precipitated, and a deep red-brown limpid liquid is obtained, which is free from chlorine, but contains all the iron in solution as ferric ethylate. The alcohol can be distilled off, and the ferric ethylate is left as a black pasty mass, soluble in absolute alcohol, benzene, chloroform, ether, petroleum, and methyl alcohol. If, however, this residue is heated in a vacuum so as to expel the last traces of the solvent, the small quantity of water present almost completely decomposes the ethylate, and ferric hydroxide separates out. If the operations of filtration, etc., have been conducted in dry air, the ethylate is not completely decomposed. An alcoholic solution of ferric ethylate is not precipitated by a current of dry ammonia, but with dry carbonic anhydride it yields a brown precipitate. Dry hydrogen sulphide reduces it to a ferrous salt, and potassium ferrocyanide precipitates ferric hydroxide.

The action of water varies with the proportion in which it is present. If the alcoholic solution is exposed to a moist atmosphere, or is mixed with a small quantity of water, ferric hydrate is deposited as a jelly. If, however, the alcoholic solution of ferric ethylate is poured into an excess of water, limpid liquids are obtained which have the properties of the solutions of colloidal ferric hydroxide described by Graham. They coagulate spontaneously after some time, and are coagulated by addition of various substances, such as carbonic anhydride, sulphuric acid, tartaric acid, potassium chloride, sodium chloride, river water, etc. Acetic, nitric, and hydrochloric acids and ammonia have no effect. Hydrogen sulphide produces a black precipitate. The time which elapses before coagulation takes place increases with the dilution of the solution, and is diminished by an increase of temperature. A higher temperature is required to produce coagulation the greater the amount of water present, and a solution of 1 vol. ferric ethylate solution in 15 vols. of water is not coagulated even after four hours' ebullition.

The coagulated ferric hydroxide forms a thick jelly, which always fills the vessel even if the solution is dilute. At first it is transparent, but it gradually contracts with elimination of water. The coagulation of the ferric hydroxide varies with the conditions in the same way as the coagulation of blood, a fact which indicates that inorganic

colloïds are analogous to the nitrogenous colloïds of the animal organism.—*Jour. Chem. Soc.*, May, 1884, p. 573; *Compt. Rend.*, vol. 98.

## CARVOL.

By A. BEYER.

Gladstone has shown that the carvol obtained from dill-oil agrees in its principal physical properties with the carvol from caraway oil. Flückiger found that the carvol obtained from German mint-oil, *Mentha crispa*, differed from the carvol from the other two sources in being strongly lævorotatory. The author has re-examined the carvol obtained from these three oils. To obtain it, the crude oils were distilled, the portion of the caraway oil distilling at 223°, those of the German mint-oil at 215 to 230°, and 200 to 215° being employed. The crude dill-oil was used without distillation. The hydrogen sulphide compounds,  $(C_{16}H_{14}O)_2SH_2$ , were first obtained in the crystalline state and recrystallized from a mixture of three parts of chloroform and one of alcohol. The yield from caraway oil was 8 per cent., that from dill-oil 40 per cent., whilst the first fraction of the mint-oil yielded 50 per cent., the second fraction 30 per cent. All the hydrogen sulphide compounds melted at 187°. The specific rotatory power  $[a]_D$  at 20° of the compound from caraway oil was +5.53, from dill-oil +5.44, from mint-oil -5.55. No crystallographic difference in the compounds could be detected. By the action of hydrogen sulphide on an alcoholic solution, all the three compounds were converted into the amorphous thiocarvol  $(C_{10}H_{14}S)_2SH_2$ . The carvol obtained from all the hydrogen sulphide compounds agreed in boiling point and density; and the specific rotatory power of carvol from caraway oil and dill-oil was nearly the same, being dextrorotatory; the carvol from mint-oil, however, was lævorotatory ( $[a]_D = -62.46$  at 20°).

The carvol from mint-oil was distilled from metaphosphoric acid, the resulting *carvacrol* dissolved in potash solution, filtered, decomposed with sulphuric acid, and the *carvacrol*,  $C_{10}H_{14}O$ , was dried over calcium chloride. It solidified at -20° to a crystalline mass. The boiling point was 230 to 231°, sp. gr. at 4° 0.975, specific rotatory power 0. The crystalline barium salt of *carvacrolsulphonic acid* was also prepared. It was thus shown that the *carvacrol* from lævorotatory carvol is identical with the *carvacrol* from dextrorotatory carvol. A small quantity of a hydrocarbon boiling at 168 to 171° was obtained from the mint-oil. It was lævorotatory, and appeared to be a terpene.—*Jour. Chem. Soc.*, March, 1884, p. 331; *Arch. Phar.*, [3] vol. 21.

## THAPSIA RESIN.

BY F. CANZONERI.

The root of *Thapsia Garganica*, a plant known for its vesicating properties, yields to boiling alcohol a white amorphous waxy substance, slightly soluble in ether and carbon bisulphide, and melting, after purification, at  $90^{\circ}$ . This substance, however, forms but a small part of the thapsia root. More abundant and important constituents are obtained by treating the dried and chopped root in a percolator with ether, whereby a yellow solution is obtained, which, on distilling off the ether, yields an amber-colored syrupy resin possessing strong vesicating properties. This acid dissolves in strong aqueous potash at ordinary temperatures and in dilute potash when heated—in both cases with great rise of temperature—and on neutralizing the resulting solution with hydrochloric acid, a yellow curdy precipitate is formed, having an unpleasant odor, and consisting of a mixture of liquid and solid ethers and fatty acids, together with resinous substances. From this mixture of products, the author has obtained: (1.) An octoic or caprylic acid,  $C_8H_{16}O_2$ . (2.) A new acid of the series  $C_nH_{2n-2}O_4$ , which he designates as thapsic acid. (3.) A non-azotised neutral vesicating substance.

This last constituent was obtained in very small quantity only, and in some preparations was altogether absent; it is moreover very difficult to purify from resinous substances and wax, by which it is generally accompanied. It dissolves in hot alcohol, and separates on cooling in shining needles melting at  $87^{\circ}$ ; also in ether and in carbon bisulphide; all its solutions possess vesicating properties. Heated with strong potash-lye, it dissolves partially and is precipitated in the crystalline state on diluting the solution with water. It is not altered by boiling with strong acids. Heated on platinum foil, it burns away without residue, emitting a pleasant odor.

THAPSIC ACID,  $C_{16}H_{30}O_4$ , is obtained by pressing between paper the curdy precipitate formed on adding hydrochloric acid to the solution of the resin in aqueous potash, and crystallizing it several times from boiling alcohol with addition of animal charcoal. It forms white shining scales melting at  $123-124^{\circ}$ , nearly insoluble in water, benzene, and carbon bisulphide, soluble in alcohol, less soluble in ether. When strongly heated, it distils without alteration; ignited on platinum foil, it burns with an odor of burnt wax. It is but slowly attacked by



bromine or by strong nitric acid. It is a bibasic acid. Its *potassium salt*,  $C_{16}H_{28}O_4K_2$ , forms shining anhydrous prisms. The *barium salt*,  $C_{16}H_{28}O_4Ba$ , obtained by precipitation from the potassium salt, is a white amorphous powder insoluble in water and very slightly soluble in boiling alcohol. The *silver salt*,  $C_{16}H_{28}O_4Ag_2$ , is a white insoluble precipitate which blackens when heated or exposed to light.

Thapsic acid dissolves at boiling heat in aqueous ammonia, and the solution on cooling deposits a crystalline substance probably consisting of the corresponding amide. The acid heated with aniline at  $170-180^\circ$  in sealed tubes, is converted into the anilide,  $C_{16}H_{28}O_2(NHPh)_2$ , which forms a white crystalline powder melting at  $162-163^\circ$ , and acquiring a faint violet color when exposed to the air.

The barium salt of thapsic acid distilled at a moderate heat with excess of barium hydroxide, yields a small quantity of hydrocarbons, saturated and non-saturated, having a musky odor, combining for the greater part with bromine, and forming a solid body which when dried between bibulous paper and crystallized from alcohol, forms white needles melting at  $73^\circ$ .

**OCTOIC OR CAPRYLIC ACID**,  $C_8H_{16}O_2$ .—On distilling with steam the oily precipitate obtained by neutralizing with hydrochloric acid the potash solution of the ethereal extract of the resin, after removal of potassium thapsate and dilution with water, there passes over a yellow transparent oil, lighter than water. On exhausting this oil with ether, drying the etheric solution with calcium chloride and distilling, the greater part goes over at  $220-236^\circ$ ; and on fractioning this portion at intervals of  $5-5^\circ$ , three other fractions are obtained, the most abundant of which is a colorless liquid soluble in alcohol and ether, and solidifying when cooled with snow, in flexible laminae melting at ordinary temperatures. The product thus obtained is shown by analysis to have the composition of an octoic acid, and in its melting and boiling points it agrees nearly with the octoic acid obtained by saponification of cocoanut oil, and by oxidation of the octyl alcohol from heracleum oil, melting at  $16^\circ$ , boiling at  $236-237^\circ$ , which agreement the author has further confirmed by examination of the sodium, barium, and zinc salts.<sup>1</sup>

The author suggests that thapsic acid may be a *dioctoic acid*,  $C_8H_{15}O_2 \cdot C_8H_{15}O_2 = 2C_8H_{16}O_4 - H_2$ , formed from the octoic acid by slow oxidation in the body of the plant.—*Gazetta*, 13, 514-521; *Jour. Chem. Soc.*, April, 1884, p. 460.

<sup>1</sup> The octyl alcohol of heracleum oil is an iso-alcohol,  $CHMe_2(CH_2)_4 \cdot CH_2OH$ , and consequently the acid obtained from it by oxidation must be an iso-acid,  $CHMe_2(CH_2)_4 \cdot COOH$ . (See Watts' *Dictionary of Chemistry*, 8, 379.)—H. W.

## RED RESINS KNOWN AS DRAGON'S BLOOD.

By J. J. DOBBIE AND G. G. HENDERSON.

Besides the red resins from *Pterocarpus Draco* and *Croton Draco*, there are three different recognized kinds of dragon's blood, one from the East Indies, *Calamus Draco*; one from Socotra, and one from the Canary Islands, *Draccena Draco*. The first of these is the only one that has been fully described, but the results are not concordant; this is due apparently to the researches having been carried out on different substances. The authors have now investigated this subject, and have examined several varieties of the so-called dragon's blood, which they find can be arranged in four distinct groups: 1. Those which dissolve completely in chloroform, carbon bisulphide, and benzene; 2. Those soluble in chloroform, but insoluble in carbon bisulphide and benzene; 3. Those soluble in chloroform and benzene, and partly in carbon bisulphide; and 4. Those which are insoluble in all three reagents. The accuracy of this classification is supported by the physical properties of the resins and their behavior towards reagents, and it is evident, therefore, that there were four different kinds of resins under examination. All the resins dissolve to a small extent in boiling water, those of Class 4 being rather more soluble than the others; they are all freely soluble in alcohol, ether, oil of cloves, and glacial acetic acid, leaving a variable amount of insoluble matter, which usually consists of vegetable tissue, sand, etc. They are all slightly soluble also in hydrochloric acid, those of Class 2 being the most soluble; ammonia reprecipitates them from this solution. The aqueous and alcoholic solutions have an acid reaction. When treated with sodium hydroxide, the resins effervesce and emit an odor like that of rhubarb. Ammonia forms a clear mixture with the alcoholic solutions. The resins were carefully purified by means of ether, and then powdered; the results of the individual class examinations may be thus summed up: Resin, 1, brick-red, melting at about 80°, when decomposed by heat gives off very irritating red fumes. It dissolves readily with an orange-red color in alcohol, ether, chloroform, carbon bisulphide, and benzene, but with difficulty in boiling caustic soda, ammonia, sodium carbonate, and with great difficulty in lime-water, whilst, in the cold, it is scarcely soluble in the first two and insoluble in the last two of the latter reagents. The ammonia solution is reddish-yellow, and a portion of the resin is not dissolved. The alcoholic solution gives a brown-red precipitate

with lead acetate. Analysis (combustion and lead estimation) suggests the formula  $C_{18}H_{18}O_4$ . This variety is derived from *Calamus Draco*. Resin 2,  $C_{17}H_{19}O_5$ , origin uncertain, is carmine-red, melting at about  $100^\circ$ ; when heated it gives off non-irritating fumes. It dissolves freely in alcohol, ether, and chloroform with a pink color, and in cold caustic soda, ammonia, sodium carbonate, and lime-water with purple color changing to orange-red or yellow on boiling, whilst it is insoluble in carbon bisulphide and benzene. The alcoholic solution gives a lilac-colored precipitate with lead acetate. Resin 3,  $C_{18}H_{18}O_4$ , from *Dra-cæna*, is vermilion, melting at about  $80^\circ$ ; when heated it evolves aromatic irritating red fumes. It dissolves with a blood-red color in alcohol and ether, and in cold caustic soda, ammonia, lime-water, and sodium carbonate, but is insoluble in chloroform, carbon bisulphide, and benzene. Its alcoholic solution gives a mauve-colored precipitate with lead acetate. Resin 4, is a mixture of a reddish-brown resin, freely soluble in carbon bisulphide, and a light brick-red resin, nearly insoluble in that menstruum. The two portions differ considerably with regard to their solubility in ether, benzene, and other reagents, the dark portion being the less soluble of the two. Cinnamic acid was detected in the first and third varieties but not in the others. Johnstone found two resins in one kind of dragon's blood, to the one he gave the formula,  $C_{20}H_{24}O_4$ , and to the other,  $C_{20}H_{21}O_4$ .—*Phar. Jour. and Trans.* [3], 14, 361–364; *Jour. Chem. Soc.*, April, 1884, p. 462.

#### NOTE ON A SAMPLE OF SOPHISTICATED SAFFRON.

BY J. HART, PH.C.

A few days ago my attention was drawn to a yellow powder at the bottom of a shop bottle containing saffron (*Crocus sativus*). The abundance of the powder (in proportion to the small quantity of saffron), together with its weight, induced me to make a thorough examination of it, and as I have not met with similar results (possibly owing to the want of indices and of more time to search the literature), the following remarks may be of interest:

For the purpose of comparison, 10 grains of a very fine sample of saffron, recently purchased, were incinerated in a platinum crucible; the ash obtained weighed .5 grain, equaling 5 per cent. The process was repeated with an exactly similar result. This corresponds with "Pharmacographia," which gives "5 to 6 per cent." as the ash of

genuine saffron. Ten grains were then placed under a bell jar and allowed to dry until the weight became constant. The loss was found to be .25 grain, thus bringing up the ash of a thoroughly dry specimen to 5.12 per cent.

The suspected saffron was very dry; but there was nothing in the color to indicate the presence of mineral matter. There was no perceptible effervescence on the addition of dilute HCl, either in the powder or the saffron, proving absence of  $\text{CaCO}_3$ . Ten grains of the saffron, freed as much as possible from powder by shaking and rubbing, yielded 2 grains, equaling 20 per cent. of ash, showing 14.88 per cent. of adulteration, even after being freed from all loose powder, when compared with a dry specimen of pure saffron. Ten grains of the loose powder (containing a small quantity of saffron) were then incinerated and yielded 0.5 grains of ash, the bulk of which was insoluble in boiling  $\text{HNO}_3$ , and gave the characteristic flame of barium. An attempt to ascertain the exact nature of the ash from a further 10 grains of powder was frustrated by an unfortunate accident resulting in the loss of the whole. The remaining saffron and powder were then incinerated and the ash analyzed with results as given below. This ash of course contains a proportion of normal ash, but the source of adulteration is proved beyond doubt.

Constituents of ash expressed as parts per 100:

$\text{BaSO}_4$ .....	64.28
$\text{CaSO}_4$ .....	14.57
$\text{Al}_2\text{O}_3$ , with trace of Fe.....	10.71
Salts of K and Na.....	9.28
	<hr/> 98.84

*Remarks.*—It is of course impossible to accurately estimate the amount of adulteration, but I think it may be safely set down at from 25 to 30 per cent. I regret that I did not first make a microscopical examination, for although a large quantity of the powder must have fallen off, still sufficient was left on to have been indicated by the microscope. Both these samples were from houses of the highest standing, and in each case the top market price was paid, the adulterated specimen costing 50s. a few months ago, and the pure 48s. per pound in January last. Another proof is thus afforded, that neither the price paid nor the reputation of the wholesale house is at all times a sufficient guarantee of genuineness.—*Phar. Jour. and Trans.*, March 15, 1884, p. 738.



## CASCARA AMARGA—HONDURAS BARK.

BY F. A. THOMPSON, PH.C., Detroit, Michigan.

Cascara Amarga, also known as Honduras Bark, is obtained from a tree indigenous to Mexico. A description of this tree I am unable to furnish. Specimens of this bark have been submitted to Dr. Vasey of the Department of Agriculture at Washington, for examination, resulting in the opinion that it belonged to the genus *Picramnia* (from *picros*, bitter, and *thamnos*, shrub), which numbers no less than twenty species. Dr. Vasey having only two varieties in his possession he was unable to determine the exact variety. *Picramnia* is said by different botanists to belong to the natural order Anacardiaceæ.

The bark as seen in commerce, is mostly deprived of its outer bark which is from one to three millimeters thick, of a brownish-gray color, striated, and much divided by numerous longitudinal fissures. After being immersed in water, it assumes a greenish-yellow tint. The inner bark is of a deep-brown color, three or four millimeters thick, hard, and firm, of a bitter taste, and on examination of a transverse section numerous white spots are to be seen, which appear to be filled with a white insoluble inert substance.

*Microscopical Examination*:—The outer or cork bark (*a*) is composed of twenty-five or thirty rows of regular thick-walled cells, filled with red coloring matter. The middle bark is composed of large, irregular parenchyma cells (*d*) making up the greater share of the whole bark. Throughout this portion of the bark are numerous sclerenchyma cells (*b*) arranged in groups and also one to three rows are always found close to the outer bark. These sclerenchyma cells make a prominent marking, as seen with naked eye, in cross-section fig. 2. Also at intervals, are one to three ranked series of sclerenchymatous fibres or bast-fibres (*c*) arranged tangentially, which turn brown after treatment with iodine. The inner bark does not differ very much from the middle except it is divided by several rows of medullary rays (*e*) composed of regular cells.

*Chemical Examination*:—A portion of drug dried at 110° C until constant weight, was found to lose 10 per cent. as moisture. Another portion was incinerated, leaving a white ash amounting to 4.55 per cent.



FIG. 1.—Cascara amarga, showing inner and outer surface; natural size.



FIG. 2.—Cross-section, magnified 5 times.



FIG. 3.—Transverse section magnified 75 diameters. *a*, outer bark or cork; *b*, sclerenchyma cells; *c*, sclerenchymatous or bast fibres; *d*, parenchyma cells; *e*, medullary rays.

Soluble in water: K, Na, sulphate, carbonate.....	1.10
Soluble in dilute hydrochloric acid; Aluminum, iron, phosphates and carbonates.....	2.89
Insoluble in sodium hydrate; sand.....	.56
Total.....	4.55

Several portions of drug were treated with benzol, alcohol and water:

Amount extracted with benzol.....	2.72 per ct.
“ “ “ alcohol (78.9 at 60°).....	10.00 “
“ “ “ cold water.....	4.16 “

The benzol residue was dried at a low temperature, that at 110° C. removing volatile oils and traces of moisture. This residue was treated with several portions of warmed acidulated water, this solution giving reactions for an alkaloid, with tannic acid, Mayer's reagent and other test-reagents. Residue was treated with eighty per cent. alcohol (sp. gr. 848 at 60°) dissolving resins leaving a residue of fixed oils, resins and wax.

The following table gives the systematic course of analysis:

Benzol extract contains: Volatile oils driven off at 110° C.....	.50 per ct.
Soluble in acid water, reactions for alkaloids.....	.22 “
Soluble in alcohol (78.9), resins.....	.40 “
Insoluble in alcohol, wax, resins, etc.....	1.06 “
Total.....	2.72 “

Eighty per cent. alcohol extract contains:

Extractive matter.....	12.65 per ct.
Inorganic ash.....	.4 “
Matter soluble in water.....	9.00 “
Ash “ “ “ “.....	.50 “
Matter sparingly soluble, amorphous.....	.55 “

The dried alcoholic extract treated with several portions of absolute alcohol (79.38 at 60°) evaporated to a dry extract contains:

Matter soluble in water, including.....	6.34 per ct.
Tannin, organic acids, some extractives precipitated with lead sub-acetate.....	1.66 per ct.
Lead removed from solution with H <sub>2</sub> S filtrate gave reactions for alkaloid with test reagents.	4.68 “
Insoluble in water.....	1.25 “
Soluble in dilute ammonia hydrate, acid resins.	.41 “
Insoluble in ammonia hydrate, neutral resins.	.84 “

Matter insoluble in absolute alcohol contains :

Soluble in water, including.....	3.55	"
Colors, some extractives precipitated with lead sub-acetate.....	2.01	"
Matter not precipitated with lead sub-acetate, freed from lead with H <sub>2</sub> S gave reaction for alkaloid and trace of glucoside.....	1.54	"
Matter insoluble in water; containing.....	1.31	"
Soluble in acidulated water, reactions for alkaloids.....	.27	"
Insoluble in acid water, resins, extractives.....	1.04	"
Total extract.....	12.65	"

Remaining drug was treated with cold water, yielding 4.16 per cent. extract; then with hot water containing sulphuric acid, changing starch into glucose, which was approximately estimated with a standard Fehling solution, showing 1.94 per cent. calculated as starch.

A portion of drug was treated by the U. S. P. process for cinchona assay. The alkaloid solution after neutralizing with sodium hydrate was shaken out with several portions of a mixture of chloroform and ether, and allowed to evaporate at a moderate temperature, yielding 3 per cent. of brownish-yellow amorphous alkaloid, which has a sweetish taste at first, afterward becoming bitter. This alkaloid was treated with dilute sulphuric acid, hydrochloric, tartaric and others, but was unable to obtain crystals from any of the salts. Salts of this alkaloid are freely soluble in water, insoluble in ether or chloroform, are amorphous, forming a white powder when pulverized. Treated with strong sulphuric or nitric acid was unable to notice any colored reactions.

Several pounds of drug were treated with lime water, dried and exhausted with hot alcohol, which on cooling deposited a white amorphous substance, which was treated several times with hot alcohol and allowed to separate out on cooling as a white, crystallizable, tasteless substance, having a low fusing point, freely soluble in chloroform, less soluble in ether and benzine; insoluble in dilute acids and fixed alkalies, and when fused on platinum-foil develops a strong fat-like odor, reminding one of the odor of the fats when fused. A small portion allowed to crystallize from hot alcohol, deposited white, acicular-shaped crystals.

The alkaloid, obtained in different ways, I would suggest to name, Pieramine.



To ascertain the exact nature of this alkaloid remains for a future study which I hope I may be able to give to it. The alkaloid seems to have the peculiar taste found in the bark on chewing a portion, and I think the virtue of the drug will be partly if not entirely represented by the alkaloid. Samples of Picramnine alkaloid are being submitted to the medical profession, hoping to receive soon some information as to its properties — *Ther. Gazette*, Jan., 1884.

*Laboratory of Parke, Davis & Co., December, 1883.*

## MORPHINE.

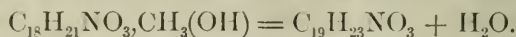
BY O. HESSE.

The author has studied the action of acetic and propionic anhydrides on morphine and its derivatives. With regard to the nomenclature introduced by Grimaux, the author contends that the term codeïne is unjustifiable. When the hydroxylic hydrogen in morphine is replaced by the acetyl group, the resulting product is mono- (or di-) *acetylmorphine*; and when it is similarly replaced by methyl, etc., the resulting compounds should be called *methylmorphine*, etc., and not codeïne, codethyline, etc. For derivatives where one of the hydrogen-atoms of the nucleus is replaced by methyl, etc., the author proposes the name of *morphimethine*, etc.

Morphine dissolves easily in excess of acetic anhydride at 85°, to form *diacetylmorphine*. This substance crystallizes in anhydrous prisms, which are easily soluble in alcohol, sparingly so in ether, melt at 169°, and with hydrochloric acid yield a hydrochloride which gives no coloration with ferric chloride. No more highly acetylated body could be obtained. *Dipropionylmorphine* was prepared in a similar manner. It is amorphous, easily soluble in alcohol, ether, and chloroform, sparingly so in water. The *hydrochloride* is an amorphous powder easily soluble in water and yielding a pale yellow amorphous *platinochloride*,  $[C_{17}H_{17}(C_3H_5O)_2NO_3]_2, H_2PtCl_6$ . Morphine methiodide treated with freshly precipitated silver chloride yields *morphine methochloride*, crystallizing in long colorless needles, containing  $2H_2O$ , which it loses at 120°. It dissolves in concentrated sulphuric acid without discoloration, but the solution turns violet when heated. It gives a dark blue coloration with ferric chloride in aqueous solution. The *platinochloride* forms orange needles containing 1 mol.  $H_2O$ . Morphine methiodide dissolves with difficulty in acetic anhydride at 100–120°, and forms

the diacetyl compound. The yield is, however, very bad, a much more satisfactory result being obtained with morphine methochloride. *Diacetylmorphine methochloride* crystallizes in concentrically grouped needles, which are easily soluble in water, and give no coloration with ferric chloride. From its solutions potassium iodide precipitates *diacetylmorphine methiodide*. The chloride yields a pale yellow *platinochloride* crystallizing in small needles containing 1 mol.  $H_2O$ , which they partly lose on exposure to the air, completely at  $110^\circ$ . The action of methyl iodide on morphine in the presence of bases has already been studied by Grimaux ("Am. Jour. Phar.," 1881, 619). With acetic anhydride codeïne (methyilmorphine) gives *acetylcodeïne* crystallizing from ether in prisms which melt at  $133^\circ$ . When propionic is substituted for acetic anhydride, *propionylcodeïne* (*propionylmethyilmorphine*) is formed; on evaporating its ethereal solution, this is left as a colorless film easily soluble in ether, benzene, and alcohol. It dissolves in sulphuric acid with a bluish tint, which turns dark blue on the addition of a trace of ferric chloride. When heated, both solutions turn dark green. It yields crystallizable salts with acids. The *hydrochloride* crystallizes in large colorless needles containing  $2H_2O$ , and soluble in water and alcohol; it gives a yellow crystalline *platinochloride*. The *acetate* crystallizes in colorless needles soluble in water. It loses a part of its acetic acid at  $100^\circ$ . The *hydriodide* crystallizing with 1 mol.  $H_2O$ , the *oxalate* with  $3H_2O$ , and the sulphate are all soluble in water. *Codeïne methochloride* (*methyilmorphine methochloride*) is obtained from codeïne methiodide by treatment with silver chloride; and crystallizes in large rhombic prisms with 1 mol.  $H_2O$ . It yields a yellow flocculent *platinochloride* with  $3H_2O$ . The *sulphate* gives colorless needles containing  $4H_2O$ . A solution of the last-named salt yields, with barium hydroxide, a colorless solution of *codeïne methylhydroxide*, which on evaporation over sulphuric acid, deposits crystals of *methocodeïne* (*methyilmorphinethine*). The unchanged hydroxide solution precipitates hydrates from solutions of metallic salts, and rapidly absorbs carbonic anhydride from the air. Codeïne methiodide dissolves in acetic anhydride at  $85^\circ$ , and deposits oblong rectangular tables of *acetylcodeïne methiodide* on cooling. Thus obtained, the crystals are anhydrous; but on recrystallization from alcohol, colorless needles containing  $4H_2O$  are obtained. The *platinochloride* forms a yellow crystalline precipitate. If a solution of sodium, potassium, ammonium, barium, or calcium hydroxide be added to an aqueous solution of

codeïne methiodide, a colorless strongly alkaline solution is obtained, which gradually becomes colored, and deposits *methocodeïne*. The reaction is quickened by using an excess of the alkali and heating to boiling. The action of the alkalis is therefore to liberate the hydroxide from which the elements of water are subsequently eliminated,



For the preparation on a large scale, it is best to boil the methiodide with rather more than the molecular weight of potassium hydroxide, extract the hot solution with benzene, and shake out the base with acetic acid. The acetic solution is then saturated with sodium chloride, and the precipitated chloride recrystallized from a small quantity of water. A concentrated aqueous solution of the chloride is then decomposed with sodium hydroxide, and the base at once extracted with ether. In a few minutes the ethereal solution deposits long colorless prisms of *methocodeïne*. Freshly precipitated, this substance dissolves freely in ether, but when crystallized only sparingly. It crystallizes from boiling alcohol in prisms, from boiling water in needles, in the latter case with 1 mol.  $\text{H}_2\text{O}$ . It melts at  $118.5^\circ$ , and dissolved in 97 per cent. alcohol gives  $[\alpha]_D = -208.6^\circ$  when  $p = 4$  and  $t = 15^\circ$ . In moderately concentrated sulphuric acid, the base and its salts dissolve to a colorless solution, which gradually becomes of a purplish-violet tint, and turns olive-green when heated. The base gives a blue color when heated with concentrated sulphuric acid. The *hydrochloride* crystallizes with  $2\text{H}_2\text{O}$  in needles soluble in 10.8 parts of water at  $18^\circ$ . The *platinochloride* is of a dark green color.

*Methocodeïne* dissolves in acetic anhydride at  $85^\circ$ , and yields *acetyl-methocodeïne*. It melts at  $66^\circ$ , and gives a blue coloration with concentrated sulphuric acid. It is soluble in alcohol, sparingly so in water. The salts crystallize easily; the *hydrochloride* with  $\frac{1}{2}\text{H}_2\text{O}$ , the *platinochloride* with  $4\text{H}_2\text{O}$ , the nitrate with  $3\text{H}_2\text{O}$ , and the sulphate with  $8\text{H}_2\text{O}$ .

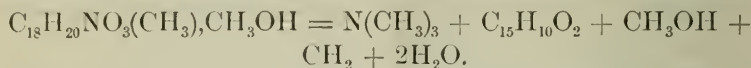
With methyl iodide *methocodeïne* forms  *$\alpha$ -methocodeïne methiodide*, crystallizing in prisms with  $\frac{1}{2}\text{H}_2\text{O}$  and soluble in water. The  *$\alpha$ -methochloride* is obtained from the methiodide by the action of silver chloride, but could not be obtained in a crystalline form. It gives a blue color with concentrated sulphuric acid. The  *$\alpha$ -platinochloride* is a yellow flocculent precipitate.  *$\alpha$ -Codeïne methochloride* dissolves in acetic anhydride forming  *$\alpha$ -acetylcodeïne methochloride*, which crystallizes

with  $2\frac{1}{2}\text{H}_2\text{O}$  in long colorless silky needles, easily soluble in alcohol and boiling water, sparingly so in cold water. It gives up 2 mols.  $\text{H}_2\text{O}$  at  $100^\circ$ , but the remainder cannot be expelled without decomposition setting in. With concentrated sulphuric acid it gives a brownish-red coloration. The *platinochloride* forms a sparingly soluble yellow crystalline precipitate. An aqueous solution of the  $\alpha$ -iodide becomes milky on addition of potassium or sodium hydroxide, and gradually deposits an oil which appears to be unchanged iodide. If, however, the solution be boiled with alkali, an oil is deposited on cooling, which solidifies after a time. This substance is not the original iodide, but is isomeric with it, and the author therefore names it  *$\beta$ -codeïne methiodide*. It differs from the  $\alpha$ -iodide in crystalline form, in containing no water of crystallization, and in being less soluble in water. The  *$\beta$ -chloride* was not obtained in the crystalline form, and gave a purplish-violet color with concentrated sulphuric acid. The  *$\beta$ -platinochloride* yields small orange needles: the sulphate is amorphous. Decomposed with barium hydroxide, the sulphate yields the alkaline  *$\beta$ -methocodeïne methylhydroxide*, which crystallizes in small colorless plates and flat prisms, soluble in water and alcohol. If the solution be evaporated at  $30\text{--}40^\circ$ , an amorphous deliquescent and highly caustic mass is left. This, however, is not a pure body. The  *$\beta$ -chloride* yields  *$\beta$ -acetyl-methocodeïne methochloride*, from which the  $\beta$ -iodide can be obtained by double decomposition. The *platinochloride* forms a yellow powder containing  $3\text{H}_2\text{O}$ .

These results confirm the presence of only two hydroxyl groups in morphine; and the author points out that these two groups are different in character, the hydrogen of one being replaceable by either positive or negative radicals, that of the other only by the radicals of the fatty acids. Morphine methiodide is not decomposed by boiling with bases, whereas directly the hydroxylic hydrogen atom is replaced by an alcohol radical, the stability of the methiodide is at once reduced, and in the presence of bases, its decomposition and the introduction of the methyl radical into the nucleus takes place even at ordinary temperatures. The author believes the hydrogen atom thus replaced to be one in close proximity to the hydroxyl group, which is only displaceable by acid radicals, and not, as Gerichten and Schrötter contend, one of those combined with the nitrogen atom. He declines to accept as proved, the formation of methylethylpropylamine by the decomposition of ethocodeïne methylhydroxide, on which Gerichten and Schröt-



ter base their argument. On the latter supposition, the author should have obtained dimethylpropylamine by the decomposition of methocodeine methylhydroxide, whereas he only obtained trimethylamine. He believes the decomposition to take place according to the equation :



The ethyl compound would then give ethylene in the place of methylene, and this was observed by Gerichten and Schrötter, but ascribed by them to a secondary reaction.

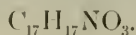
The author is inclined to look upon *laudanine* as a morphine derivative containing propionyl, but in which the relative character and stability of the two hydroxyl groups is different to what is the case in morphine. He is now continuing his researches in that direction.—*Jour. Chem. Soc.*, May, 1884, p. 613, from *Annalen*, vol. 222.

## PSEUDOMORPHINE.

BY O. HESSE.

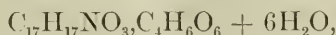
In his first communication on this alkaloid, which he obtained from opium, the author stated his belief that it was identical with the oxymorphine of Schützenberger, and that its formula was  $\text{C}_{17}\text{H}_{19}\text{NO}_4$ . Brockmann and Polstorff (1880) contended that this oxy-morphine had the constitution  $(\text{C}_{17}\text{H}_{18}\text{NO}_3)_{22}$ , and based their assumption principally on the fact that nitric oxide was evolved in its production from a solution of morphine hydrochloride and silver nitrite, whereas the formula  $\text{C}_{17}\text{H}_{19}\text{NO}_4$  would require an evolution of nitrous oxide. The author now shows that if an aqueous solution of morphine hydrochloride is mixed in molecular proportions with a solution of potassium nitrite, and the whole heated for some time at  $60^\circ$ , crystals of oxymorphine are formed, and a gas evolved which does not turn red in contact with the air, and is consequently not nitric oxide. The formation is evidently due to the decomposition of morphine nitrite,  $2\text{C}_{17}\text{H}_{19}\text{NO}_3, \text{HNO}_2 = 2\text{C}_{17}\text{H}_{19}\text{NO}_4 + \text{N}_2\text{O} + \text{H}_2\text{O}$ , and the author points out that an evolution of nitric oxide, when silver nitrite is used, might also be explained by the equation  $4\text{C}_{17}\text{H}_{19}\text{NO}_3\text{HNO}_3 = 4\text{C}_{17}\text{H}_{19}\text{NO}_4 + \text{N}_2 + \text{N}_2\text{O}_2 + 2\text{H}_2\text{O}$ .

The author now finds that the body  $\text{C}_{17}\text{H}_{19}\text{NO}_4$  is a hydrate of the real base, and that the formula for oxymorphine is therefore

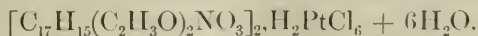


The hydrate loses its water at  $130^{\circ}$ , but the base is so very hygroscopic that it is only by taking special precautions that rehydration can be prevented. The less crystalline the specimen in question, the more marked is its hygroscopic character. The alkaloid is best purified by solution in ammonia, from which it crystallizes in colorless crusts containing  $1\frac{1}{2}\text{H}_2\text{O}$ , which it loses at  $130^{\circ}$ . The *hydrochloride*  $\text{C}_{17}\text{H}_{17}\text{NO}_3\cdot\text{HCl}$ , crystallizes in scales containing, under varying conditions, respectively 1, 2, 3, and 4 mols.  $\text{H}_2\text{O}$ . A *basic hydrochloride*  $(\text{C}_{17}\text{H}_{17}\text{NO}_3)_2\cdot\text{HCl} + 6\text{H}_2\text{O}$ , is obtained in microscopic crystals from a hot neutral acetic solution on the addition of sodium chloride: from a cold solution, the basic salt crystallizes with  $8\text{H}_2\text{O}$ . With platinum chloride both the neutral and basic salts yield a yellow flocculent platinochloride  $(\text{C}_{17}\text{H}_{17}\text{NO}_3)_2\cdot\text{H}_2\text{PtCl}_6$ .

The *hydriodide*,  $\text{C}_{17}\text{H}_{17}\text{NO}_3\cdot\text{HI} + \text{H}_2\text{O}$ , loses its water when exposed to the air: the *chromate*  $(\text{C}_{17}\text{H}_{17}\text{NO}_3)_2\cdot\text{H}_2\text{Cr}_2\text{O}_7 + 6\text{H}_2\text{O}$ , loses  $4\text{H}_2\text{O}$  at  $80^{\circ}$ : the sulphate crystallizes with  $6\text{H}_2\text{O}$ , and effloresces slightly in dry air, but when crystallized from boiling water it is stable: the *oxalate* yields shining scales, with  $8\text{H}_2\text{O}$ : the *acid tartrate*,



crystallizes in needles or prisms. Heated for two hours at  $120^{\circ}$  with acetic anhydride, pseudomorphine yields *diacetylpseudomorphine*,  $\text{C}_{17}\text{H}_{15}(\text{C}_2\text{H}_3\text{O}_2)_2\text{NO}_3$ . It crystallizes from ether in concentrically grouped flat prisms, containing  $4\text{H}_2\text{O}$ , which it loses in the desiccator. It is moderately soluble in ether and chloroform, very soluble in alcohol, in which it yields a strongly alkaline solution. It contracts at  $250^{\circ}$ , but does not melt until  $276^{\circ}$ . It gives no coloration with ferric chloride. With hydrochloric acid, it forms a salt crystallizing in quadratic tables, easily soluble in water. With platinum chloride, this salt yields a pale yellow flocculent *platinochloride*,



The di-acetyl compound is easily reconverted into the original base by heating it with alcoholic potash. It is clear, therefore, that the hydroxyl-groups of morphine are still present in pseudomorphine. The author was unable to obtain a methyl compound by the action of potassium hydroxide and methyl iodide. He, however, obtained pseudomorphine methyl-hydroxide,  $\text{C}_{17}\text{H}_{17}\text{NO}_3\cdot\text{MeOH}$ . The author also believes pseudomorphine to be identical with the substance which

E. L. Meyer ("Berichte" [4], 121) obtained by the action of moderately concentrated sulphuric acid on a nitro-compound which he had obtained by passing a strong current of nitrous anhydride into water in which morphine was suspended.—*Jour. Chem. Soc.*, May, 1884, p. 616; from *Annalen*, vol. 222.

## VARIETIES.

ALUMEN USTUM IN INTERMITTENT FEVER.—Schidowski, (*Wratsch*): Burnt alumen has long been known as a febrifuge. S—— does a large country practice, being alone in a district of 70,000 inhabitants, and he had only three pounds of quinine at his disposal for a whole year. He resorted to alum with good results. Two doses of eight grs. each, one to three hours before the recurrence of the fever, effected the object. The powder is given dry and water is drunk copiously after it. He also saw enlargement of the spleen reduced by it.—*Amer. Med. Digest*, May 15.

SULPHIDE OF CALCIUM FOR SCABIES.—Dr. Dolan (*"Brit. Medical Journal"*), says that sulphide of calcium, known in Poorlaw service as golden lotion, is more effectual in the treatment of itch than conventional sulphur ointment. It may be made by the following formula: Flowers of sulphur, 100 parts; quick-lime, 200 parts; water, 1,000 parts. Boil the whole for some time, stirring occasionally until the substance become incorporated, allowing the liquid to cool, and decant into hermetically sealed bottles. It should not be made in a metal vessel.

It is applied as follows: The patient is first put into a warm bath; he is then painted with a brush dipped in the solution and placed in bed, either in blankets, or a flannel nightgown. After a short time, owing to the deposit of sulphur, the patient's body is almost the color of a guinea. The beneficial effects are speedily manifested; the itching ceases, and, as a rule, in simple cases, after another warm bath, the patient may be discharged cured.—*Amer. Med. Digest*, May 15.

INCOMPATIBILITY OF SULPHATE OF QUININE AND IODIDE OF POTASSIUM.—In a communication to the Biological Society, M. Rabuteau calls attention to the ill effects of iodide of potassium and sulphate of quinine, when administered together or at short intervals. These effects are, on the part of the digestive organs, anorexia, nausea, epigastric pain, colic, and sometimes vomiting; on the part of the general system, *malaise*, slowing and feebleness of the pulse, pallor, and a sense of fatigue. These results are due to the decomposition of the iodide and the liberation of free iodine. This decomposition takes place, not alone in the stomach, but goes on in the intestine also. The same result occurs from the use of an iodide sophisticated with an iodate of potassium. Iodine is set free, and to the action of this is to be referred the local and systemic effects above mentioned.—*Med. News; Lancet and Critic*, March 1.

## HOW TO SECURE GOOD DENTAL ORGANS AND PRESERVE THEM FROM DECAY, PREVENT RICKETS, HIP DISEASE, ETC.

BY H. E. DENNETT, D. D. S., Boston.

It is conceded that dental decay is the dissolving away of lime salts by vitiated secretions. This is not due so much to a want of cleanliness of the mouth as is generally supposed. It is not true that "A clean tooth never decays." One may devote twelve hours out of the twenty-four to the ablution of the mouth and fail to prevent decay of the teeth, so long as Nature's dietic laws are violated. Acid will dissolve lime whenever the two meet. Acid saliva may be expected to follow an excessive use of acids, or of those elements which are capable of being converted into acids, or from a deficiency of the opposite elements.

Perfect health includes a perfect set of teeth. The teeth are little indicators that denote by their condition that of the whole system, just as a thermometer indicates thermal changes.

Stripped of all mystery the rule for health so far as food is concerned is simplicity itself. Nature has given to every one an appetite which, in its normal condition may be relied upon to make a proper choice of foods. Select then, the food for which the appetite calls containing all its natural elements and Nature will take care of the results. Dental development in man is discernable as early as the seventh week of intra-uterine life, hence the importance of a strictly correct diet from the first, if mothers desire to give birth to children who may have perfectly formed. The lime from her teeth will be dissolved, taken into the circulation and appropriated by the offspring. As a consequence, the mother who passes through the periods of gestation and lactation without a sufficient amount of bone and tooth element in her food, will suffer from loss of teeth, neuralgia, rheumatism, and other diseases which result from an impoverished state of a system drained to its utmost. Excepting civilized man all flesh-eating animals take as much of the bone with the flesh they consume as they can break with their teeth sufficiently fine to swallow, and all have good dental organs. Take from any carnivorous animals their supply of bone which Nature furnishes with the flesh and dental decay will be the inevitable result. Several years ago the lions in the Zoological Gardens of London were fed upon the thighs of horses which were too large for them to break and eat. As a consequence their young were born with cleft palates and died. Subsequently they were fed upon deer and other small-boned animals, and their young were born with perfectly formed palates and lived. Veterinary surgeons have long known that certain diseases of their dumb patients can only be successfully treated by feeding them with bone meal. A dam too aristocratic to gnaw bones gave birth to successive litters of rickety pups; but after eating food which contained a liberal supply of bone meal, she produced perfectly healthy ones, and by the same sire. Arguments in favor of eating bone to prevent the decay of the teeth as well as



to cure a long catalogue of bone and kindred diseases might be continued indefinitely ; but as "A word to the wise is sufficient," it seems only necessary to add that a long and continued experiment has been made upon a family with most satisfactory results. The bones used were selected from perfectly healthy animals, none being accepted that bore the slightest blemish, carefully cured without being allowed to pass through any perceptible chemical changes, finely granulated and incorporated into soups, gravies, bread, etc., in the proportion of from one to three spoonfuls to each pint of gravy, soup, or flour. The relative proportion of nutritive elements in one hundred parts of different kinds of animal food have been found as follows : beef 26, mutton 29, pork 24, chicken 27, milk 7, bone 51.

## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, May 22, 1884.

In absence of the president, Mr. Alonzo Robbins was called to the chair, and the minutes of the last pharmaceutical meeting were read and approved.

Professor Trimble exhibited a specimen of *Chinese galls*, their peculiar appearance attracted attention. They are produced by the puncture of an insect named provisionally *aphis chinensis*, upon the leaf or leaf stalks of the *rhus semialata*, as stated in the National Dispensatory, and are stated to contain between 70 and 80 per cent. of tannin. Prof. Trimble also exhibited specimens of *extract of quebracho*, both solid and liquid, the former containing about 74 per cent. and the latter 55 per cent. of tannin. This extract is not that obtained from the *aspidosperma* bark used for medicinal purposes, but by a different plant, *Loxopterygium Lorentzii*, and is used in the arts for tanning and as a coloring agent.

A very elegantly crystallized specimen of *milk sugar* was exhibited by Prof. Trimble. It was obtained from Messrs. Boericke & Tafel, homœopaths, of this city. Whether it was made in this country, or only recrystallized was not stated. The purity of the article is determined by the quantity of ash ; in this case, the result of a number of determinations showed there was only  $\frac{2}{100}$  of one per cent.

Dr. F. V. Greene, U. S. N., presented a very white and beautiful specimen of *grape sugar* (solid glucose), prepared by the Glencove Manufacturing Co. (Duryea's) of Long Island.

One of the members thought that a return to the method of notifying the members of the college by means of postal cards would be likely to secure a better attendance.

There being no further business a motion to adjourn was carried.

T. S. WIEGAND, Registrar.

HAIR TONIC.—Prof. Gross suggests the following : R. Tinet. cantharidis, ʒiiss ; tinct. capsici, gtt. xx. ; glycerini, ʒss ; aque coloniensis, q. s. ad ʒvj. M. Sig. "Hair Tonic."—*Coll. and Clin. Record*.

## PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

THE MARYLAND PHARMACEUTICAL ASSOCIATION was welcomed at its annual meeting in Baltimore, May 13th, by Mr. Joseph Roberts, President of the Maryland College of Pharmacy. President Thomson's address, reports of officers and committees and discussions on pharmaceutical matters occupied the time of the Association. The new officers are D. C. Auginbaugh, Hagerstown, President; Steiner Schley, N. J. Corning and L. D. Collier, Vice-Presidents; E. W. Russell, Baltimore, Treasurer; and M. L. Byers, Hagerstown, Secretary.

INDIANA PHARMACEUTICAL ASSOCIATION.—The third annual meeting was held at Evansville, May 13th to 15th. Ex-President G. H. Andrews, occupied the chair. The Association was welcomed by Mayor Bridwell. The President's address and reports of the various officers and committees were read and suitably disposed of. The most important subjects discussed were pill coating, the pharmaceutical uses of starch, errors in prescriptions, the quality of spiritus frumenti, percolation, petroleum ointments, etc. The officers for the ensuing year are: W. L. Johnston, Evansville, President; G. Eliel, T. Gasser and W. H. Ross, Vice-Presidents; Jos. R. Perry, Indianapolis, Secretary; and Emil Martin, Treasurer. On the afternoon of May 15th, the members, with many guests, enjoyed a steamboat excursion on the Ohio river to the mouth of Green river and to Henderson.

NEBRASKA PHARMACEUTICAL ASSOCIATION.—At the annual meeting held in Omaha, May 14th, several practical papers were read and various subjects of trade interest were discussed. The new officers are: Norman A. Kuhn, Omaha, President; J. Z. Cross, H. Cook and J. Reed, Vice-Presidents; H. H. Whittlesey, Crete, Secretary; and C. M. Leighton, Lincoln, Treasurer. The next meeting will again be held in Omaha, on the second Wednesday, 13th day of May, 1885. James Forsyth is Local Secretary.

LOUISIANA PHARMACEUTICAL ASSOCIATION.—The second annual meeting convened at Baton Rouge, on May 19th, President Thibodeaux in the chair. The President's address, reports of officers and committees and a number of papers on different subjects formed part of the proceedings. The officers elected are R. N. Girling, New Orleans, President; A. K. Finlay and J. J. Mellon, Vice-Presidents; Ben. Lewis, New Orleans, Secretary; C. L. Keppler, Corresponding Secretary; and J. B. Lavigne, Treasurer. The Association will hold its next annual meeting in New Orleans, either in April or May, and an invitation was extended to the American Pharmaceutical Association to meet there likewise, when the International Cotton Exposition will be still open.

THE NEW JERSEY PHARMACEUTICAL ASSOCIATION met in Educational Hall, at Asbury Park, May 21st and 22d, President Vandervoort in the chair, and was welcomed by Dr. Mitchell, President of the Board of Health. The time was occupied with the reading of the President's address, of the reports of officers, committees and the Pharmacy Board, and of papers on

chemistry by N. Brant, on pharmaceutical legislation by H. P. Reynolds, and on *syrup of tolu* by G. W. Parisen. The latter paper suggested a process similar to that of the Pharmacopœia of 1870, using hot, in the place of cold, water. Prof. Maisch referred to the various processes in use for making this syrup, and stated that if it was merely intended as a flavoring material, digestion of tolu in water, as directed by the French Codex, would yield a perfectly transparent syrup; the use of magnesium carbonate was objectionable on account of its slight solubility; if, however, it was intended to have the resinous matter also present, a process similar to that for the present syrup of ginger, using an alcoholic solution of tolu, would seem to be preferable to that adopted by the Pharmacopœia.

Interesting experiments on *pepsin* were reported by Mr. Am Ende, who found that some pepsins would but little affect meat fibres, while others acted more energetically, causing the striæ to disappear almost completely. Prof. Maisch asked whether experiments had also been made with the mucous membrane of the stomach, and referred to experiments made by Selldén in 1873, but which appear to be little known here; from these experiments it appeared that maceration with acidulated water extracted only a portion of pepsin, but that by digestion with water an additional and stronger pepsin could be obtained. Pepsin seemed to exist partly in an insoluble or latent condition, which view had more recently been corroborated by several French investigators.

In response to a call, Prof. Maisch stated that he had intended to bring to this meeting, as a subject of general interest, some tubers of the *parent plant of the cultivated potato*, which he had recently received from Mr. H. Bowman, from California; but that they had sprouted to such an extent, that in order to save them, they had to be planted. This plant had been discovered by Prof. Lemmon in Arizona, in the Huachuca Mountains, at an elevation of 9,000 feet, and had been named by Prof. Asa Gray *Solanum tuberosum* var. *boreale*. The tubers are quite small, about half an inch or little more in length, and are of two varieties, red and white.

The officers elected are: President, A. P. Brown; Vice Presidents, F. P. Kilmar and R. E. Parsons; Secretary, R. H. Vansant, Ocean Grove; Corresponding Secretary, R. J. Shaw; Treasurer, Wm. Rust, New Brunswick. The next meeting will take place in the city of Camden, on May 20th, 1885.

On the evening of May 21st, the Local Secretary, Mr. Wm. C. Bakes, tendered a reception to the members and guests, at his residence, at Ocean Grove, which was also attended by many residents of the two adjoining towns. On the morning of May 22d a visit was paid to the studio of Mr. Theodore R. Davis, which is located on the beach, and contains many curious and interesting works. After adjournment the park and conservatories of Mr. Hoey, at West End, near Long Branch, were visited.

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THE ALUMNI ASSOCIATION OF THE PITTSBURG COLLEGE OF PHARMACY was organized April 29th, and the following officers were elected: President, C. H. Beach; Vice Presidents, J. Wurzell and S. McElroy; Treasurer, A. C. Robertson; Secretary, W. S. Jones; and Corresponding Secretary, D. F. Robinson.



## EDITORIAL DEPARTMENT.

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PIPMENTHOL.—This name, we think, should be given to the stearopten from the oil of peppermint. The menthol at present in the market is obtained from a Chinese or Japanese volatile oil which Mr. E. M. Holmes has shown to be obtained from one or two varieties of *Mentha arvensis* (see "Amer. Jour. Phar.," 1883, p. 15). We have now before us specimens of a menthol, prepared by Mr. Albert M. Todd, of Nottawa, St. Joseph co., Michigan, which we are informed is obtained from oil of peppermint prepared in Michigan, and which has not merely a mint-like odor, but has the odor of peppermint. It is in snow-white acicular glossy crystals, and another specimen in delicate white needles forming stellate groups and of a satiny lustre. Even if it should prove to be chemically identical with the menthol as hitherto seen, we believe it to deserve a distinctive name to denote its origin. Mr. Todd informs us that he has succeeded in devising a commercially practical process by which it can be prepared, and we hope to be soon in the position of giving our readers further information concerning its origin and composition.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

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*Handbuch der qualitativen Analyse anorganischer und organischer Substanzen, nebst Anleitung zur volumetrischen Analyse.* Bearbeitet für Apotheker und Geriehtschemiker, sowie zum Gebrauche beim Unterricht in chemischen Laboratorien, von Arthur Meyer, Assistent am pharmaceutischen Institute der Universität Strassburg. Mit in den Text eingedruckten Holzschnitten. Berlin: R. Gaertner's Verlagsbuchhandlung, 1884. 8vo, pp. 208.

Handbook of the Qualitative Analysis of Inorganic and Organic Substances, with a guide to volumetric analysis. For apothecaries and forensic chemists, and for use in chemical laboratories.

This work differs very materially from the text-books on analytical chemistry which are generally used, and that it has been written for a special purpose and with the full conception of the means for attaining this purpose, soon becomes evident on examining it. It was not written for the tyro in analytical work, but he who has acquired the requisite proficiency, will find it of very valuable assistance in such investigations as are pointed out on the title page. The reactions are described with sufficient minuteness, but without prolixity, to be readily understood and executed, and those are chiefly considered which serve either for determining the group to which the compounds belong, or for distinguishing them from other similar ones.

The first portion of the work relates to eighteen organic compounds, mostly alkaloids, and employed in medicine. Of these the reactions are given as observed in the isolated state, and next in mixtures, such as naturally occur, or which are often made for medicinal purposes. The quantitative determination of some of the alkaloids is then treated of, and finally their recognition when mixed with other organic matters. Next in order sixteen organic acids are considered, all of these being employed, medi-



cinally or analytically, in the free state or combined. Then follows the systematic course of qualitative analysis in which all the more frequently occurring elements and organic as well as inorganic acids, with their soluble and insoluble constituents are considered; the most important reactions of the inorganic acids; the determination of inorganic and organic poisons; volumetric analysis with special reference to the second edition of the German Pharmacopœia, and finally a table giving the strength of the reagents in use.

The work is well gotten up, the illustrations are very good, and the different kinds of type used readily attract the eye and direct special attention to the various facts, conditions and causes.

*Drugs and Medicines of North America.* A quarterly devoted to the historical and scientific discussion of the Botany, Pharmacy, Chemistry and Therapeutics of the Medicinal Plants of North America, their constituents, products and sophistication. By J. U. Loyd (commercial history, chemistry and pharmacy) and C. G. Lloyd (Botany and Botanical history) Cincinnati: J. U. and C. G. Lloyd.

The first number of the periodical bearing the above title made its appearance in April. It is a handsome quarto containing thirty-two pages of text, which is printed in clear type upon good paper, and is published at the low price of \$1 per year. The long experience and the peculiar facilities of the editors and authors in the procuring and handling of North American drugs, have led us to expect this to become a very valuable and trustworthy publication, and the initial number more than fulfills our expectations. The historical and descriptive portions of the several articles are well written, and the literature has been thoroughly searched, so that but little and nothing of importance has escaped the authors. The illustrations of the plants and their parts are clear and instructive, and the microscopical section of the stem of *Clematis virginiana* has been artistically rendered.

Judging from this number the plants will be considered in accordance with their botanical relations, which also indicate in many cases close connection in regard to their chemical and medicinal properties, so that the different volumes will constitute a systematically arranged account of those North American plants which have been more or less employed as curative agents. It is one of those works which deserve to be in the hands of every one interested in the subject.

*Elements of Modern Chemistry.* By Adolphe Wurtz, Senator, member of the Institute, etc. Second American edition. Translated and edited with the approbation of the author, from the fifth French edition, by Wm. H. Greene, M. D., Professor of Chemistry in the Central High School, Philadelphia, etc. With 132 illustrations. London and Philadelphia: J. B. Lippincott & Co., 1884. 8vo, pp. 770. Price \$2.50.

We have noticed the first American edition of this valuable work in "Amer. Jour. Phar.," 1879, p. 384, and now on the appearance of the second edition, merely refer to what we then stated more in detail. The size of the book has been increased by eighty-three pages, but this increase alone does not represent the labor bestowed upon it. It has been thoroughly revised so as to embody the progress made in the meantime and still preserve its original character; the metals have been arranged in accordance with the theory of atomicity, and various new chapters have been added,

the principal portion of the additions, as was to be expected, having been made to organic chemistry, in which department many new facts have been elicited of late years.

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*Shakespeare as a Physician.* By J. Portman Chesney, M. D., ex-Secretary Medical Society of the State of Missouri, etc. St. Louis, Chicago, and Atlanta: J. H. Chambers & Co., 1884. 8vo, pp. 226. Price \$2.25.

When we first read the title of this work, we were surprised and wondered what new discoveries might have established the fact that the immortal bard had in reality been a practitioner of medicine, and had written his grand works during the leisure hours between visiting his patients. But on turning over the leaves it became apparent, that the collection of his references to any science or specialty of the present day, would be calculated to show the poet in the light of an observer and thinker on subjects in which he was not specially skilled either by education or vocation. Such a collection from Shakespeare's works has been made by the author and arranged in nine chapters, which are entitled obstetrics, psychology, neurology, pharmacologia, etiology, dermatology, organology, chirurgery and miscellaneous. This seems to be quite a formidable array, and it is interesting indeed to have the expressions or dialogues relating to these subjects commented upon in the light of the medical knowledge of the present day; interesting not only to the physician but to intelligent persons generally. Of particular interest to us has been the pharmacological chapter, which contains the remedies and poisons, mentioned or referred to in Shakespeare's works. In our opinion it is futile to base upon the symptoms described in the text of his works, opinions as to the knowledge in those days of nicotine, chloral, chloroform, oxalic acid and other compounds, which chemistry has furnished us in modern times; it is rather to be wondered that the poet's descriptions should accord in so many cases with the observations of modern physiology.

It should be mentioned yet that the author has carefully compared the text of different editions of Shakespeare's works, and has pointed out errors which were introduced by "emendations," but not committed by the poet. It has undoubtedly been a troublesome labor for the author to compile, sift and comment upon these particular subjects, but it was evidently a labor of love, which has been laudably performed.

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*Sexual Neurasthenia* (nervous exhaustion) its hygiene, causes, symptoms and treatment, with a chapter on diet for the nervous. By George M. Beard, A. M., M. D., etc. Edited by A. D. Rockwell, A. M., M. D., etc. New York: E. B. Treat, 1884. Pp. 270. Price \$2.00.

This work is published from a posthumous manuscript of the author, arranged and edited by his former associate, Dr. Rockwell. It considers the subject in all its bearings, and dwells fully on the requisite hygienic measures and the medical treatment. Coming from the pen of an eminent writer on a subject upon which he was one of the keenest observers, the book will be duly appreciated by physicians who desire to profit from the extensive experience of the author.

*Practical Hints and Formulas for Busy Druggists.* Original, contributed, and compiled. By Benjamin Lillard. Vol. I, Part I. New York: J. H. Vail & Co., 1884. Svo, pp. 80, interleaved. Price \$1.

The book contains a large number of formulas and practical hints, many of them contributed by well-known writers. It would be difficult to contrive any sort of system for their arrangement, but a full index facilitates the use. The blank leaves serve for the preservation of additional matter, and blank space is left in the index for recording the additional titles.

*New York and Brooklyn Formulary of Unofficial Preparations.* Published by a joint committee of delegates from the College of Pharmacy of New York, the New York German Apothecaries' Society, and the Kings County Pharmaceutical Society.

This is a collection of 81 formulas of so-called elegant preparations, mostly elixirs, but comprising also emulsions, spirits, syrups, etc., for which pharmacopœial formulas were not adopted owing to their ephemeral or questionable value, and which are still more or less prescribed. The three societies mentioned above have done a commendable work in a direction, which in a still broader form we have advocated from time to time for years. This example should be followed by other localities and might well be extended so as to comprise in addition to non-pharmacopœial elegant preparations, intended for taking the place of similar articles manufactured on the large scale, also compounds for domestic remedies, which might be offered and recommended in the place of the numerous secret medicines. The Joint Committee appeal to the medical fraternity to *abstain hereafter from designating the maker's name* of any preparation for which they offer a formula. The little work will be sold at a mere nominal price, to cover the cost of printing it, and may be obtained by addressing the New York College of Pharmacy.

*Pharmacopœia Germanica, Editio altera* (The German Pharmacopœia. Second edition, which by authority of the Federal Council replaces the first edition on January 1, 1883. Translated by C. L. Lochman. New York: J. H. Vail & Co., 1884. Pp. 295. Philadelphia: D. Phreaner. Price \$2.50.

A little over ten years ago we noticed the English translation by M. Lochman of the first German Pharmacopœia, and now we have before us the translation of the second edition, the original of which was noticed in "Amer. Jour. Phar.," 1882, p. 639. It will be remembered that it appeared simultaneously with the new United States Pharmacopœia. Our readers are familiar with the nature and scope of the work, more especially with the Galenical Preparations, the formulas for which we have published and compared with those of the U. S. P. in the Journal for 1883. The volume now before us is a faithful translation, and contains also the English synonyms and in most cases the titles of the corresponding preparations of the U. S. P., which synonyms, however, refer to the names only, but in the large majority of the preparations not to identity in strength. As far as we have examined this work, we have observed only few typographical errors, and one mistake in placing the German name "Aetherische Eisen-chlorid-tinctur" to the tincture preceding Tinctura ferri chlorati aetherea, to which latter it properly belongs.



*Étude micrographique et spectroscopique des Teintures et des Alcoolatures et en particulier des Teintures d'Opium.* Par H. F. François Gay, Pharmacien de première classe, etc. Montpellier: Boehm et Fils. 1883. Pp. 110.

Micrographic and Spectroscopic Studies of Tinctures and Tinctures of fresh herbs (alcoolatures), and particularly of the tinctures of opium.

This is a thesis, presented to the École supérieur de Pharmacie de Montpellier, on a subject of great importance to the pharmacist, on which investigations were made by H. Deane and H. Brady, W. Gilmour, W. W. Stoddart and others. The preparation of tinctures by different methods is considered, with their composition, preservation and changes to which they are subject under varying conditions, and with their physical and chemical properties, and their optical and micrographic characters. The literature has been well searched and compiled, and a large number of facts observed by the author and by others have been collected. The work is accompanied by five lithographic plates, giving the microscopic appearance of precipitates occurring in tinctures, and of crystals formed by the spontaneous evaporation of various proximate principles, and of tinctures of opium prepared from different material; also a lithographic plate illustrating the spectroscopic investigations.

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*Le Gelsemium sempervirens au point de vue botanique, chimique, physiologique et thérapeutique.* Par Paul Pradel, Pharmacien de première classe, etc. Montpellier: Cristin, Serre et Ricome. 1884. Pp. 40.

*Gelsemium sempervirens* from the botanical, chemical, physiological and therapeutic standpoint.

This American drug has for some years past attracted more or less attention in Europe; but the investigations to which it has been subjected, have been mainly made by American and English pharmacists and physicians. The latest investigations made by Prof. Wormley and Dr. E. Schwarz ("Amer. Jour. Phar.," 1882, pp. 387 and 389) seem to have escaped the author's notice.

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*Excerpts from Professor Hugo Schulz's Treatise on Eucalyptus Oil.* Translated and supplemented by Baron Sir Ferd. von Mueller, K. C. M. G., etc. Sydney: L. Bruck. Pp. 48.

A reprint from the "Australasian Medical Gazette," treating mainly of the physiological action and therapeutic uses of the drug named.

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*Essai d'une monographie locale des Conjuguées.* Par François Gay, Préparateur à l'École supérieure de Pharmacie. Montpellier: Boehm & Fils. 1884. Pp. 112.

Conjugate; a local monograph.

This is a valuable contribution to the literature on minute algaceous plants, belonging to the families Desmidiaceæ, Mesocarpææ and Zygnemaceæ, which the author has found in the neighborhood of Montpellier. It contains four well executed lithographic plates, each with numerous figures of the plants described.



*Société des Pharmaciens de l'Eure.* Bulletin No. 10. Compte-rendu des Séances des 29 Avril et 30 Septembre, 1883. Evreux: E. Quettier. Pp. 86.

Besides the proceedings of the Society and several reports, the pamphlet contains investigations on commercial extracts of cinchona, belladonna, and conium, by Lepage; on the coloring matter of wines, by Pinchon; on the estimation of potassa and soda in mixtures, by Pinchon; and on arsenical compounds, by C. Patrouillard.

*New York State Medical Association*; founded, February, 1884. Pp. 43.

This pamphlet contains the minutes of a convention held in the city of Albany, February 4 and 6, 1884, at which the New York State Medical Association was organized on a permanent basis by physicians who adhere to the code of ethics of the American Medical Association.

*The Recent Advances of Sanitary Science.* The Relation of Micro-organisms to Disease. By Henry O. Marey, A. M., M. D., President of the American Academy of Medicine, etc.

An address, full of interest, delivered before the Academy at its last annual meeting at New York, October 10, 1883.

*The Student's Grammar of Latin*, for the First Instruction in the Fundamental Rules of Latin, with the Correct Roman or Continental Pronunciation. By A. F. W. Neynaber, Sr., Detroit, Mich.

A little pamphlet of 32 pages, containing the rules for Latin declension and conjugation, with the Latin names for weights and measures, the Pharmacopœial titles of medicines with the genitive case, numerals, and other words used in prescriptions.

*Report of the State Board of Pharmacy to the General Assembly of Kentucky*, February 25, 1884. Frankfort, Ky.

The Board recommends that the clause of the pharmacy law, permitting the registration of "Graduates in Pharmacy" without examination, be expunged, or if retained that graduates be defined to be those coming from institutions requiring an apprenticeship of at least three years as a condition for graduation. The Board further recommends that the provisions of the law be extended to all towns and cities of the State, and that they not apply to any practitioner of medicine "dispensing the medicines needed in his practice," the last seven words to be added as an amendment.

*The Annual Report of the Pharmacy Board of Victoria.* Melbourne, 1884.

The Board reports two convictions during the preceding year under the Pharmacy Act of 1876; one person sought to evade the law by styling himself "Botanic" druggist, and a chemist retired from business was practicing medicine and surgery. The qualifications before being eligible for the major examination are: having served for not less than four years as an apprentice in the business of a registered pharmaceutical chemist, or chemist and druggist, or homœopathic chemist, and attended one course of lectures, and passed examinations in each of the following subjects at the University of Melbourne, or some school or college of pharmacy recognized by the Board—Materia medica, medical botany and practical chem-

istry; and passed examinations before the Board in the subject of practical pharmacy.

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*Twenty-seventh Annual Report of the Council of the Pharmaceutical Society of Victoria, 1884, with List of Members and Hon. Members.* Melbourne.

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*The Sixteenth Annual Report of the Board of Managers of the Philadelphia Orthopædic Hospital and Infirmary for Nervous Diseases* (supported by voluntary contribution).

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*Aneurism of the Femoral Artery, and a Knife-wound of the Intestines.* By Professor W. O. Roberts, M. D., Louisville, Ky. Reprint from the "American Practitioner."

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*Peroxide of Hydrogen in Suppurative Conjunctivitis and Mastoid Abscesses, with a Report of Two Cases.* By A. E. Prince, M. D., Jacksonville, Ill. Reprint from "St. Louis Medical and Surgical Journal."

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## OBITUARY.

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JEAN BAPTISTE ANDRE DUMAS died at Cannes April 11th, 1884.—"A savant has been removed from our midst whose labors in science extend over more than half a century, and who stood for a long time at the head of its progressive movement." "The last one of those great chemical researchers has stepped from the scene of life, who served as landmarks, towards which to steer their course, to those who entered the domain of chemistry during the third or fourth decennium." We quote these expressions from the remarks made by Professor A. W. Hofmann, with which he announced the death to the German Chemical Society, and we may add that Dumas was the last one of those illustrious pharmacists who, near the beginning of the present century, by their indefatigable labors guided science into new channels, and secured for it solid foundations for future generations to build upon. Dumas was born in Alais, Department of Gard, July 14, 1800, studied pharmacy in Geneva, and in 1821 came to Paris, where he spent the remainder of his useful life. Aside from his determinations of the vapor densities of iodine, sulphur, phosphorus, mercury, etc., which became of the utmost importance for theoretical chemistry, his investigations in inorganic chemistry were numerous, but those in organic chemistry were particularly fruitful of lasting results. About 1823 he analyzed in connection with Pelletier a large number of alkaloids; in 1826 he determined with Polydore Boullay the composition of compound ethers; in 1830 to 1835 he discovered oxamid and investigated camphor, many volatile oils and their steareptens; in 1835, he investigated with Peligot wood spirit and its derivatives; in 1840 with Stas the action of alkalis upon organic compounds; in 1841 the composition of indigo; in 1842 with Piria the compounds of tartaric acid; in 1843 the homologous nature of the fat acids, etc. Dumas also took an active part in determining the combining weights of elements, their replacing one another, the

constitution of compounds, and in other questions of theoretical and also of physiological chemistry, which were fruitful in new discoveries.

Aside from the numerous essays published in journals, he wrote several important works on chemical subjects, of which the eight volumes comprising his *Traité de Chimie appliquée aux Arts* appeared in 1828 to 1845. He commenced his career as teacher in 1823, when he was appointed tutor (*répétiteur*) of chemistry in the Polytechnic School, and afterwards held the chairs of chemistry in the Athenæum, in the Sarbonne and other institutions. He was for a number of years a member of the Council of Education, was elected to the Assembly in 1848, held the position of Secretary of Agriculture and Commerce in 1849 to 1851, and was subsequently made a Senator and a member of the Superior Council of Public Instruction.

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CHARLES ADOLPHE WURTZ, died Paris, May 12, 1884, having for 30 years occupied the chair of medical chemistry in the Faculty of Medicine of Paris, to which he was elected after Orfila's death, in 1853, and after Dumas's retirement in 1854, the two chairs being then united. Wurtz was born in Strassburg, Alsace, November 26, 1817, studied medicine in his native city, where he graduated in 1843, after having been in charge of the chemical laboratory since 1839, and subsequently taught chemistry in Paris and Versailles until he became connected with the Faculty of Medicine. The investigations of Wurtz, both in inorganic and organic chemistry, are very numerous, and it was more particularly in the latter that his influence has been felt in shaping the theories which are at the present time acknowledged. In 1849 he, simultaneously with A. W. Hofmann, discovered the class of compounds known as substituted or compound ammonias, or amines; in 1855 he showed the analogy of glycerin with alcohol, differing from the latter in being triatomic; in 1856 he discovered glycol and showed it to be a diatomic alcohol; in 1859 he formulated the distinction between basicity and atomicity of acids. Of his separate works, the one best known here is *Elements of Modern Chemistry*, of which the appearance of a new American edition is noticed on page 346 of this number.

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GEORGE ENGELMANN, M. D., died in St. Louis, Mo., February 11, 1884, at the age of 75 years. The deceased was born and educated in Germany, and resided in St. Louis for many years. He was one of the most noted botanists of North America.

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SAMUEL D. GROSS, M. D., who stood in the front rank of modern surgeons, died in Philadelphia, May 6, 1884. He was born near Easton, Pa., July 8, 1805, graduated from the Jefferson Medical College in 1828, and, after occupying chairs in medical schools in Cincinnati, Louisville and New York, was elected Professor of Surgery in the Jefferson Medical College in 1856, from which position he retired in 1882. In compliance with directions left by him, his body was cremated at the Lemoyne furnace in Washington county, Pa., and his ashes were taken to Woodland Cemetery, Philadelphia.

# THE AMERICAN JOURNAL OF PHARMACY.

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*JULY, 1884.*

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## BISMUTH AND PEPSIN.

BY R. ROTHER.

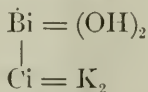
Considerable uncertainty still exists in regard to the constitution of the multiple citrates. The writer believes to have elucidated certain obscure points about their structure and to have greatly simplified the methods of their production. These considerations and processes are published in the "American Journal of Pharmacy" for March, 1876, April, 1876, January, 1883, March, 1883 and April 1883. It is there shown that in case of the iron salts, for instance, the direct application of ferrous or ferric citrate is vastly more definite, practical and expeditious than the older processes, which are the reverse of this. The results obtained by the new method are in numerous instances chemically identical with those of the former method, and in the remaining cases a close approximation to them. A great improvement was also made in the production of bismuth citrate, and as an immediate consequence, in that of the ammonio-citrate. In treating of this latter compound ("American Journal of Pharmacy," March, 1876) the writer stated that a crystalline modification of it exists. On this occasion a constitutional formula of the ammonio-citrate was given. Subsequently, however "American Journal of Pharmacy," March, 1883), the writer was enabled by means of a different method to establish a more accurate formula. The fact has since been ascertained that the crystalline salt results from a deficiency of ammonia consequent upon its dissipation by the action of heat or even simple exposure at ordinary temperatures. The writer found that by heating one m. of bismuth citrate with two ms. of ammonium bicarbonate in the presence of about ten times their weight of water, a perfect solution rapidly results, attended by copious effervescence of carbonic anhydride. By augmenting the citrate further combination takes place and thus generates the crystalline compound above referred to. A further increase of the citrate is also absorbed, whilst the compound becomes more and



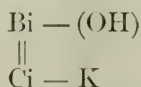
more insoluble. When the citrate is so far augmented as to stand in the proportion of one m. to one m. of the bicarbonate the whole of it does not combine. By treating one m. of bismuth citrate in a similar manner with two ms. of sodium bicarbonate a perfect solution is obtained which on evaporation yields a slightly deliquescent colorless scaled salt. The same results when one m. of sodium monocarbonate is used. An excess of either carbonate on the application of heat precipitates a bulky and gelatinous bismuthyl carbonate. Excess of citrate is absorbed as in the case of the ammonium salt. A small excess yields a clear solution which on condensation gives a white granular and soluble residue. An increased amount of citrate up to one m. for one m. of the bicarbonate enters into combination, but the resulting compound is only soluble in a very large volume of water aided by heat.

One m. of bismuth citrate treated with two ms. of potassium bicarbonate or one m. of the monocarbonate in the preceding manner also gives a clear solution, decomposable by excess of carbonates, and yields on evaporation a very deliquescent colorless scaled salt. A slight excess of citrate readily dissolves and then produces, as in case of the sodium compound, a granular very soluble residue. An increase of the citrate up to one m. for one m. of the bicarbonate readily combines forming a rather freely soluble compound having a decided acid reaction and being possessed of absolute permanence in any volume of water. It is not decomposed by neutral chlorides, but chlorhydric acid destroys it with precipitation.

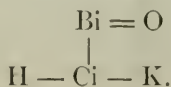
The salt generated by two ms. of potassium bicarbonate and one m. of bismuth citrate, and to which sodium and ammonium form corresponding analogues, is constitutionally represented by the formula :



Then the salt formed by one m. of the bicarbonate may be indicated by the formula :



There are, however, plausible reasons that the structural symbol is



A mixture of this acid salt with the preceding neutral one results when an excess of bismuth citrate reacts upon the alkaline carbonates as already explained above. This mixture is absolutely permanent in aqueous solution, but the chief interest attaching to it rests in the fact that it forms no insoluble combinations with pepsin. The perfect stability of the solution renders it the achieved desideratum upon which the following process for a perfect and permanent acidulous solution of bismuth and pepsin is based :

Pepsin saccharated.....	250 parts.
Bismuth citrate.....	100 "
Potassium bicarbonate sufficient.	
Diluted chlorhydric acid.....	20 "
Alcohol.....	1,000 "
Water sufficient to make.....	10,000 "

Mix the diluted chlorhydric acid with 3,000 parts of water, add the pepsin, and macerate the mixture for several days, or until the pepsin is dissolved; then add a crystal of potassium bicarbonate, and when effervescence has ceased decant the solution. Mix the bismuth citrate and 40 parts of potassium bicarbonate with 4,000 parts of water and heat the mixture until effervescence has ceased and filter the solution. Mix the alcohol with 1,000 parts of water and add it to the pepsin and bismuth solutions previously mixed together, with enough water to make the solution weigh 10,000 parts.

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**Remedy for Rhus Poisoning.**—As this is the season when many persons are making excursions into the country, it is to be expected that there will be many who will suffer from poison contracted by contact with the poison oak. Various remedies have been employed to relieve the suffering thus occasioned, but while one remedy is advantageous to some persons it utterly fails with others. Having learned of a great number of cases in which fluid extract of serpentaria has been used with remarkable success, I thought it would be well to communicate the fact to your journal, as I have never seen it noticed in medical or pharmaceutical journals. It is best applied by placing cloths moistened with the extract upon the affected parts, without any friction. Two or three applications generally effect a cure.

T. S. WIEGAND.

## ON SYRUP OF TOLU.

BY E. CLAASSEN.

The beautiful yellow color and the fine appearance of the Syrup of Tolu prepared according to the formula of the old Pharmacopœia are, without doubt, the reason that many apothecaries continue, without making any tests, to prefer this syrup to that made as the new Pharmacopœia directs. An exact answer to the question, "Which of these two syrups has more strength, and is the best one?" seemed to be, therefore, both interesting and useful. For this purpose I took equal quantities of the syrup prepared from the Tincture of Tolu by means of magnesium carbonate and of the syrup made directly from the balsam. It is well known, as I may state here, that all the effect and power of the Syrup of Tolu is lying in the presence in it of the benzoic and cinnamic acids. These two acids are easily soluble in ether; ether will extract them readily from the syrup, leaving of them behind but a small balance. Each one of these two samples of syrup was therefore shaken with an equal volume of ether, and the ether, after separation from the syrup, evaporated in a glass dish in the open air. The ether taken from the syrup made directly from the balsam left a considerable quantity of a yellowish white residue having the characteristic smell and properties of the two acids, while the ether shaken with the syrup made from the tincture of Tolu left behind a small amount of resinous matter only. After addition, however, of some hydrochloric acid, enough to acidulate the syrup, and after shaking with ether, the last one left, when evaporated, a good deal of the acids. By this experiment it was evidently demonstrated, that in this syrup the acids in question were not present in a free state, but were liberated by the hydrochloric acid added. If any doubt could be sustained that they were combined with magnesium in the syrup, this doubt was at once destroyed by the chemical test made, viz., by the white crystalline precipitate resulting after the addition of sodium-ammonium phosphate. The magnesium carbonate used for preparing the syrup may be regarded as insoluble in water; its presence in the syrup is therefore due to the acids, which dissolve a corresponding part of it forming magnesium salts. The determination of the quantity of magnesium found present in *any* sample of syrup of Tolu, that was shaken after addition of water with magnesium carbonate, and afterwards filtered, will certainly furnish a

good means for finding the approximate amount of the acids present. The above experiments prove, I think, evidently, that the formula, as given by the new Pharmacopœia, for making syrup of Tulu is by far the best. Every apothecary will do well to follow the same, and not allow the substitution of an almost worthless syrup, the syrup of the old Pharmacopœia.

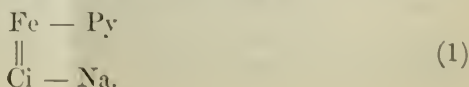
*Cleveland, O., June, 1884.*

## SYRUP OF HYPOPHOSPHITES WITH IRON.

BY CHARLES D. RANDALL.

In addition to the perfect stability, one of the chief qualities which characterizes the ferric from the ferrous salts, is the more agreeable taste of the former especially when existing in combination with an organic acid. Syrup of hypophosphites which was admitted to the list of preparations in the last revision of the pharmacopœia when made by the process there ordered contains to the fluid drachm about three grains of calcium hypophosphite and one grain each of the corresponding salts of sodium and potassium. The tendency of many of the soluble iron salts to precipitate when in the presence of the hypophosphites, has caused much trouble in the selection of a suitable salt without this property. Finally, after the subject was much discussed, ferrous lactate was selected as being the least objectionable, and is ordered in the preparation of the syrup with iron, in the proportion of ninety-six grains to the pint.

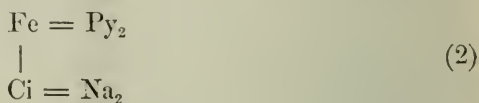
According to the pharmacopœia ferric hypophosphite is soluble in a solution of sodium citrate forming a green liquid. It is found by direct experiment that one equivalent of the hypophosphite requires one of the citrate for complete solution. This solution on concentration is shown to contain a mixture of crystals of sodium hypophosphite and an amorphous compound. The same mixture may be obtained by the inverse process—the union in solution of one equivalent of ferric citrate and three equivalents of sodium hypophosphite. If, however, one equivalent of ferric citrate be treated in solution with one equivalent of sodium hypophosphite an apple green solution results, containing an amorphous compound which may be represented thus :



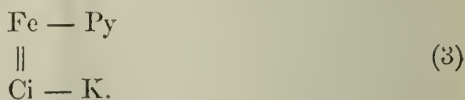


Py being the symbol for the radical of hypophosphorous acid and Ci the symbol for the radical of citric acid.

By careful evaporation the liquid may be reduced to a syrupy consistence, and after pouring on a glass or porcelain tile the product may be obtained in thin soluble scales having an acidulous taste. But if one equivalent of ferric citrate be treated in solution with two equivalents of sodium hypophosphite, a somewhat lighter green solution than the foregoing results containing a very soluble amorphous compound, which though deliquescent may be obtained in scales and is represented thus:



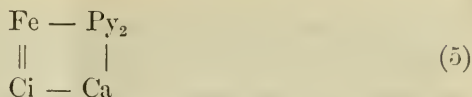
It is also found by experiment that ferric hypophosphite is soluble in potassium citrate, each equivalent of the hypophosphite requiring an equivalent of the citrate for solution. This solution is shown on evaporating to contain a mixture of crystals of potassium hypophosphite and a green colored crystalline compound. This mixture may be obtained by the inverse process, treating a solution of one equivalent of ferric citrate with three equivalents of potassium hypophosphite. But if one equivalent of ferric citrate be dissolved in a solution of one equivalent of potassium hypophosphite the solution becomes olive green in color, and contains a non-deliquescent, but very soluble scale compound which is represented thus:



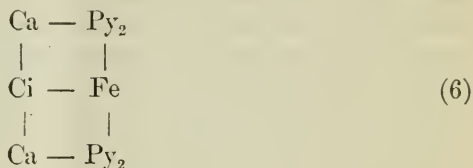
If one equivalent of ferric citrate be treated in solution with two equivalents of potassium hypophosphite, an olive green crystalline compound is formed which though quite soluble is not as freely so as the last. This crystalline compound may be represented thus:



Again, if one equivalent of ferric citrate be united with one equivalent of calcium hypophosphite, the resulting grass-green solution on concentration yields an amorphous compound, capable of being scaled and is represented by the formula:



But if one equivalent of ferric citrate be treated in solution with two equivalents of calcium hypophosphite, the solution contains a grass-green amorphous compound, which may be obtained in scales and is represented thus:



It will be seen from the foregoing results that the compounds represented by the first, third and fifth constitutional formulas cannot exist in solution with a free hypophosphite as the inevitable result will be, the formation of the compounds represented by the second, fourth and sixth formulas, respectively. It is also found that if a hypophosphite be added to a solution of either of the latter compounds, chemical union does not take place and the solution on evaporation will deposit the hypophosphite in crystals. This reaction will explain the formation of crystals of sodium hypophosphite in addition to the amorphous compound on dissolving one equivalent of ferric hypophosphite in a solution of one equivalent of sodium citrate; and the similar reaction attendant on the use of potassium citrate.

It is evident, therefore, that if ferric citrate be dissolved in a solution of an excess of the hypophosphites of calcium, sodium and potassium, one or more, perhaps all of the compounds represented by the second, fourth and sixth graphic formulas will be formed. The absolute stability and free solubility of these compounds, even in the presence of a large excess of free hypophosphites, and the fine green color of the solution consequent on their presence, are certainly sufficiently good reasons for the recommendation of the use of ferric citrate in the preparation of syrup of hypophosphite with iron.

In addition to the process ordered in the pharmacopœia for the preparation of syrup of hypophosphites which consists merely in solution, other methods are in vogue, which depend on double decomposition, including the so-called sulphate and carbonate processes.

Comments on the process ordered in the pharmacopœia are un-

necessary. The sulphate process may well be passed by on account of the impurity of the product, consequent on the solubility of calcium sulphate. The carbonates of sodium and potassium, because of their indefiniteness, the impurities they always contain and the bulkiness of the resulting calcium carbonate may well be replaced by the corresponding bicarbonates which are definite and far less liable to contamination. By employing the bicarbonates calcium bicarbonate is momentarily formed, and on being decomposed the resulting carbonate is dense and crystalline, thereby lessening the liability to loss of the liquid by absorption as well as facilitating filtration. When a moderately dilute solution of calcium hypophosphite is mixed with a solution of sodium bicarbonate no decomposition takes place. Even after standing several hours the liquid remains clear and retains its alkalinity; but when heated a few minutes the calcium carbonate is precipitated. It is a noticeable fact that under similar conditions potassium bicarbonate parts with its carbonic acid much more readily than the sodium salt does; the solution is at first clear, but soon deposits the calcium carbonate. It is therefore necessary in order to insure the complete decomposition of the sodium bicarbonate to employ a saturated solution of calcium hypophosphite. It is also necessary to heat the solution until action has entirely ceased before adding the potassium bicarbonate, which readily and rapidly decomposes.

The composition of the preparation made by the following formula is almost identical with that made by the process ordered in the pharmacopœia, each fluid drachm containing three grains of calcium hypophosphite and one grain each of the hypophosphites of sodium and potassium, and is sufficiently palatable without the aid of flavoring. The preparation contains the same amount of metallic iron as the pharmacopœia orders.

Calcium hypophosphite.....	554 parts	(or 591 grains).
Sodium bicarbonate.....	95 "	(or 101 "
Potassium bicarbonate.....	115 "	(or 123 "
Ferric citrate.....	85 "	(or 91 "
Sugar, powdered.....	4,050 "	(or 9 troy ounces.
Water, a sufficient quantity to make 10,000 parts (or 16 fluid ounces).		

Dissolve the calcium hypophosphite previously reduced to a fine powder in 3,500 parts (or 8 fluid ounces) of water with the aid of heat, and add to the solution the sodium bicarbonate, continuing the heat until action has entirely ceased. After removing the solution from the

heat add the potassium bicarbonate in small portions waiting after each addition until effervescence has ceased before adding more. When action has entirely ceased filter the liquid through paper. After the liquid has ceased to drop add enough water through the filter to make the filtrate weigh 5,850 parts (or measure 10 fluid ounces.) In 1,200 parts (or 2 fluid ounces) of this liquid dissolve the ferric citrate with the aid of heat, and add the solution to the balance of the liquid. In this solution dissolve the sugar with or without the aid of heat and filter through paper, adding through the filter enough water to make the completed syrup weigh 10,000 parts (or measure 16 fluid ounces).

*Detroit, Mich., May 30, 1884.*

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## BAYCURU ROOT.

BY FREDERICK AUGUSTUS DALPE, PH.G.

*From an Inaugural Essay.*

Baycuru is the vernacular name given to a plant, indigenous to Brazil, natural order, Plumbaginaceæ, and probably derived from the genus *Statice*. Mr. E. M. Holmes, London, believes it to be *Statice brasiliensis*. Although the Plumbaginaceæ do not generally inhabit tropical countries, some do exist there, and Dr. Symes gives some further information in regard to the origin of the plant. "It grows on the shores of the Rio Grande, and imbeds itself more or less in the sand, a number of radical leaves rising from above, and being some five to seven inches in length, by one and a half to two inches in breadth. The flower resembles that of the London pride (*Saxifraga serratifolia*). The whole plant is sometimes covered by the sea, for days and even weeks at a time, dependent on the direction of the winds, there being no tides in that locality. The natives have an unlimited amount of faith in its virtues as an astringent and discentient remedy, in all kinds of enlargements and glandular swellings; externally as a fomentation, and frequently as a vapor. It is also prescribed by the resident physicians, not as a specific, for Dr. Landell has found it to fail utterly, but as a rule it is reliable, both externally and internally, and forms a valuable astringent gargle. The root is used both in the fresh and dry states." As seen in commerce the root is sub-cylindrical, from six to eight inches in length, and from a half to an inch in width. It has a blackish brown bark externally, is quite



knotty and very rough from minute transverse fissures, and also from the removal of the cork in some places. There are also numerous depressions, probably due to shrinkage. For these reasons the root has rather a granular appearance externally. Internally it is reddish brown, and in a section cut transversely shows a rather thick bark, prominent wood-wedges, forming a circle with alternate layers of medullary tissue. The pith occupies about one-fourth of the whole diameter, and shows a few compact cells in its tissue; fracture rough, taste astringent.

Under the microscope the ordinary tissues of the dicotyledonous plants are seen. On a transverse section are seen, first the corky envelope, then the cellular envelope, consisting of six or eight layers of cells; to this is connected the liber or inner layer of bast tissue. The cambium layer follows. The wood appears on the transverse section pentangular. The medullary rays are much broader than the adjoining wood bundles. The shape of the cells of the medullium varies from irregular quadrangular to pentangular. Air passages are also visible within the wood bundles. On the longitudinal section the elongated wood cells are noticeable, as also cells of the medullary rays. The most characteristic microscopical feature, however, is what appears to be sclerogen cells resulting from secondary deposits. In some cases they seem to be composed of a group of cells and are crystalline in appearance. They are found in the pith and in the inner bark.

The material for the following analysis was kindly furnished by Messrs. Parke, Davis & Co. The plan of analysis, essentially that of Mr. H. B. Parsons, was as follows:

*Moisture*.—6.48 Gm. of the finely powdered drug were dried in a suitable vessel at a temperature of about 90°C. until it ceased to lose weight. 5.93 Gm. remained, showing a loss equivalent to 8.5 per cent. of the drug.

*Ash*.—3 Gm. of the drug by gradual incineration, in a weighed porcelain crucible, yielded an ash weighing .290 Gm., equivalent to 9.66 per cent. of the drug, and containing potassium, magnesium, sodium, and calcium, in the form of sulphates, phosphates, and chlorides, principally sodium chloride.

*Benzol Extract*.—100 Gm. of the finely powdered drug were placed in a suitable percolator, and after saturating the powder with a portion of the menstrum, and closing tightly, it was allowed to macerate for

three days; at the expiration of this time the percolation was allowed to proceed until the drug was completely exhausted. The percolate measured 296 Cc., and on evaporation yielded an extract weighing 388 Gm., equivalent to 388 per cent. of the drug. The extract was soft, of a dark green color, and consisted of a soft resin, a trace of wax and coloring matter. It was treated with warm water, filtered, and cooled. A portion of the filtrate tested by Mayer's solution, phosphomolybdic acid, platinic chloride, and other reagents for alkaloids gave negative results. Another portion boiled with dilute hydrochloric acid, and then neutralized with potassa, gave negative result with Fehling's solution, as a test for glucosides.

*Alcohol Extract.*—The drug remaining after treatment with benzol was dried, and after maceration exhausted with 80 per cent. alcohol. The percolate measured 620 Cc. An aliquot portion yielded an extract equivalent to 16.4 Gm. of the whole, or 16.4 per cent. of the drug. The extract was treated with water, and a portion of the filtrate was estimated for tannin with a freshly prepared solution of gelatin and alum. The weight of the tanno-gelatin precipitate was equivalent to 27 Gm. of the whole, and estimating 45 per cent. of this as tannin, shows a net result of 12.15 per cent. This tannin produced a green color with iron salts, was readily precipitable with solution of morphine and tartrate of antimony and potassium, in each case a white precipitate forming. The filtrate recovered from the tannin estimate was acidulated with sulphuric acid, an equal volume of alcohol added, allowed to stand for a time, filtered, washed, evaporated clear of all alcohol, and the acid solution tested for alkaloids and glucosides, with negative results for the latter. With Mayer's solution and phosphomolybdic acid precipitates were obtained. The remaining acid solution was then neutralized with ammonia, and the resulting precipitate shaken with ether in a test tube. The ethereal solution was filtered, evaporated to a small quantity, and failing to show any crystalline products, after standing for a few hours, the evaporation was continued to dryness on a watch-glass. The result, as seen under the microscope, was small feathery crystals. Several efforts were made to isolate an additional quantity of these crystals, and the following process proved successful: An alcoholic tincture was evaporated to a syrupy consistence, potassa added, and the whole shaken with chloroform. The chloroformic solution was evaporated, the residue treated with a weak acid, filtered, precipitated by ammonia, treated with ether and then

with chloroform. The crystals obtained in both cases are completely dissipated on ignition, and gave a red color with sulphuric acid, which disappeared on heating, and left a tarry-colored liquid remaining. From these evidences I take this principle to be an alkaloid, for which I propose the name *bayeurine*.

The portion of the alcoholic extract insoluble in water, was found to be principally resin. A separate investigation of the resinous bodies was conducted as follows: An aliquot portion of an alcoholic fluid extract, made from another portion of the drug, was poured into water and allowed to stand for a short time, when two resins were observed, one lighter, the other heavier than water. Their respective weights were in the proportion of .5 to 1.5, and together yielded an amount equivalent to 1.66 per cent. of the drug. The lighter resin was partly soluble in ether and alcohol, and readily soluble in cold solution of potassa. The heavier resin was sparingly soluble in alcohol, soluble in ether, partly soluble in cold solution of potassa, entirely soluble in hot solution of the same. Both resins were precipitated by normal and by subacetate of lead. Their solutions were amber-colored, and in each the color was immediately discharged on the addition of mineral acids.

*Cold Water Extract.*—The remainder of drug left after the alcohol treatment was dried, and then macerated with water. The filtrate was wine-colored, and a portion yielded an extract equivalent to 3.66 per cent. of the drug, and was found to be gum principally, and to be precipitated by strong alcohol. No albumen was present.

*Boiling Water.*—The drug left from the previous treatment was boiled with water for eight hours; the volume of water was kept unchanged. The decoction was dark colored, had a disagreeable odor, and yielded an extract equivalent to 9.39 Gm. of the whole, or 9.39 per cent. of the drug. Fehling's test proved the presence of glucose. Gum was found. Negative results were obtained for starch by the usual tests.

*Volatile Principles.*—150 Gm. of the powdered drug were placed in a retort and macerated for some days with water, then distilled. The distillate was neutral, dark colored, astringent, and possessed a very strong, disagreeable odor, so much so that it permeated the whole building in which the operation was conducted. On the surface of the distillate was found a trace of volatile oil, but not in sufficient amount

to be collected and examined. The distillate tested for alkaloids gave negative result.

The residue in the retort was then treated with potassa and water, and after standing for some days, was again subjected to distillation. The distillate was lighter in color, not so astringent (after neutralization), and the odor was less penetrating and not as disagreeable as the first distillate. What odor it possessed entirely disappeared on allowing the distillate to stand exposed to the air.

#### SUMMARY.

1. Moisture.....8.5 per cent.
2. Ash.....9.66 per cent. sulphates, chlorides and phosphates of sodium, potassium, magnesium and calcium.
3. Benzol extract......388 per cent. resin, wax and coloring matter.
4. Alcoholic extract.....16.4 per cent. alkaloid, tannin (12.15 per cent.), Resin (1.66 per cent.)
5. Aqueous extracts... } Infusion 8.66 per cent. gum.  
                                   } Decoction 9.39 per cent. glucose, gum.
6. Volatile principle.....Volatile oil (trace).

**Crystals of Potassium Nitrate obtained from the juice of Plants.**—Perfect yellowish crystals of potassium nitrate up to 10 millimeters long were found in extractum Cardui benedicti (the solid extract of *Cnicus benedictus*, *Gaertner*). They show the following combinations:  $\infty P$ .  $\infty \tilde{P} \infty$ .  $\tilde{P} \infty$ .  $2\tilde{P} \infty$  and sometimes  $P$ . Crystals of potassium nitrate separated also from an extract, made (by means of alcohol) from the root of *Oenothera biennis*, *Lin.*; they have the following planes:  $\infty P$ .  $\infty \tilde{P} \infty$ .  $2\tilde{P} \infty$ .

EDO CLAASSEN.

Cleveland, June, 1884.

HYDROBROMIC ACID must be used in much larger doses than has been customary if any benefit is to be derived from it. Such is the opinion of Dr. H. C. Wood ("Med. News," February 23), who has been using this drug recently in epileptic cases. He found in three instances that half ounce doses of the officinal hydrobromic acid was much more effectual than equivalent doses of bromide of sodium, or potassium, and not nearly so liable to produce symptoms of bromism. He gives the acid after meals, with syrup, and diluted with half a pint of water.—*Weekly Med. Review*, March 1.



## ANALYSIS OF BARLEY.

BY FRANK N. MOERK, PH.G.

*From an Inaugural Essay.*

Best Canada barley was reduced to a fine powder and treated according to the outline given by Mr. H. B. Parsons ("Amer. Jour. Phar., 1880," p. 210).

*Moisture.*—5 Gm. of the powder were placed in a weighed porcelain crucible and dried in a current of hot air at  $110^{\circ}\text{C}$ . until it ceased to lose weight. Loss 0.584 Gm., or 11.68 per cent.

*Ash.*—5 Gm. were ignited at a low-red heat until all of the carbon was consumed. The ash amounted to 0.134 Gm., or 2.68 per cent. Of this ash 0.061 Gm. was soluble in water; 0.044 Gm. in hydrochloric acid; 0.017 Gm. in solution of soda; and 0.012 Gm. was insoluble.

*Nitrogen Estimation.*—2 Gm. of the barley were mixed in a mortar with sufficient soda-lime to fill two-thirds of a 24-inch combustion tube. A small quantity of soda-lime was first placed in the tube, then the above mixture, and lastly, enough soda-lime to fill the tube to within one inch of the end. This last quantity was used to rinse the mortar. For the purpose of collecting and estimating the nitrogen which is given off, in combination with hydrogen, as ammonia, two solutions were prepared: No. I, an aqueous solution of hydrogen sulphate containing 4.9 Gm.  $\text{H}_2\text{SO}_4$  in 100 Cc.; No. II, an alkaline solution containing 0.08 Gm. sodium hydrate in 100 Cc. The equivalents of hydrogen sulphate, sodium hydrate, hydrogen nitride and nitrogen are 49, 40, 17 and 14, respectively. As 1 Cc. No. I contains 0.049 Gm. hydrogen sulphate, it requires 0.04 Gm. sodium hydrate—50 Cc. No. II—or 0.17 Gm. hydrogen nitride to neutralize it. As every 0.017 Gm. hydrogen nitride contains 0.014 Gm. nitrogen, by multiplying the number of Cc. neutralized by hydrogen nitride by 0.014 Gm. there is obtained the amount of nitrogen. 10 Cc. of No. I having been measured into the nitrogen bulbs, air-tight connections were made between these and the combustion tube. The latter was placed in a charcoal furnace and fire applied to the interior extremity of the tube and gradually moved towards the other end. When the whole tube was red-hot and gas ceased to escape, the point of the tube was broken and a little air

drawn through to displace remaining gas. The acid solution was now taken out of the bulbs and the latter thoroughly rinsed, the water used being added to the solution. A few drops of solution of litmus were added and the liquid carefully neutralized with No. II. Of 500 Cc. of No. II required to neutralize 10 Cc. of No. I, 148.5 Cc. had been replaced by the evolved ammonia; in other words, 2.97 Cc. No. I were neutralized before any of No. II had been added. 2.97 multiplied by 0.014 equals 0.04158 Gm. nitrogen in 2 Gm. barley. This, multiplied by 6.25 yields in 2 Gm. of barley 0.25987 Gm., or 12.99 per cent. of proteids.

*Benzin Extract.*—10 Gm. of finely powdered barley placed in a closely covered percolator, were macerated with 30 Cc. benzin for four hours. It was then allowed to percolate, and enough benzin was added to displace the quantity retained by the drug. The process was repeated three times and insured complete exhaustion of the drug, as, when a few drops of the last percolate were evaporated on platinum foil, no residue was obtained. This extract was evaporated on a water-bath until all of the benzin was volatilized. Weight of the extract 0.494 Gm. A little water was added to the extract and this was again evaporated on a water-bath, whereby a loss of 0.069 Gm. was incurred which was ascribed to volatile oil. Of the remainder of the extract, water dissolved 0.03 Gm. having an acid reaction; alcohol dissolved 0.245 Gm. of which 0.145 Gm. was soluble in alkali solution and precipitated again on addition of mineral acids; the portion insoluble in the alkali was an oily liquid and floated on water; 0.15 Gm. of the extract was insoluble in water or alcohol. The portion soluble in alcohol is also soluble in ether, chloroform and disulphide of carbon.

*Alcohol Extract.*—The barley treated with benzin was dried at a moderate heat and exhausted with sufficient (80 per cent.) alcohol to make 200 Cc. of percolate, which had an acid reaction. 20 Cc. were used for finding the total extract —0.5 Gm.— and ash —0.04 Gm.— Of this extract —0.36 Gm.— was soluble in water. The insoluble portion —0.14 Gm. was soluble in fixed alkalies, and consisted of proteids. 40 Cc. were evaporated to dryness on a water-bath; the residue was exhausted with boiling water and diluted to 40 Cc. This solution boiled with Fehling's solution reduced it, showing that sugar or an allied body was present.

120 Cc. were carefully neutralized with sodium hydrate and evapo-

rated to dryness. The soluble parts of the residue were extracted with sufficient boiling water to make 30 Cc. When tested with Fehling's solution it failed to reduce it, showing that no reducing sugar was present, also that the acid neutralized by sodium hydrate was capable of forming a reducing sugar by acting on an unreducible sugar or a closely allied body.

The remaining percolate —25 Cc.— was boiled for one hour with five drops of hydrochloric acid, water being added, from time to time, to preserve this measure; it was then neutralized with sodium carbonate and tested with Fehling's solution and Sachsse's test, both were reduced. By using these two solutions, we can estimate the quantity and kind of a number of reducing sugars and bodies forming reducing sugars by being boiled with acids. For instance, cane-sugar and dextrin belong to the latter class, but cane-sugar forms invert-sugar whilst the latter forms glucose, and these two products have different reducing powers with Sachsse's test, but the same with Fehling's solution, so that they can be estimated even in presence of each other. Glucose, maltose, lactose, etc., are reducing sugars and therefore are not present in the above extract. To establish the identity of the body or bodies present in the alcohol extract, a solution was prepared from the alcoholic extract of 20 Gm. barley exactly as the one mentioned before. This was concentrated to 40 Cc. and tested with Sachsse's test and Fehling's solution.

10 Cc. Fehling's solution and 30 Cc. water were brought to the boiling point in a porcelain capsule, and the above solution gradually added until all the cupric oxide was reduced. This point was found by occasionally testing for copper, by taking a few drops from the dish, acidifying with acetic acid and adding a few drops of a solution of potassium ferrocyanide. As long as there is copper in solution a reddish brown precipitate will show its presence. The quantity of the solution required to reduce 10 Cc. Fehling's solution was 9.33 Cc. As 10 Cc. of Fehling's solution are reduced by 0.05 Gm. sugar,  $9.33 : 0.05 :: 40 : x = 0.2144$  Gm. sugar in 20 Gm. barley.

40 Cc. Sachsse's test was boiled in a porcelain capsule, and the solution gradually added until all of the mercuric iodide—0.72 Gm.—was reduced to metallic mercury.

This point was found by occasionally testing a few drops taken from the capsule with a solution of potassium hydrate containing stannous oxide. If mercury is still in the solution, a black precipitate or a

brownish coloration is produced. It required 20 Cc. of the solution to reduce 40 C.c. of the test, therefore the solution was capable of reducing 80 Cc., or 1.44 Gm. mercuric iodide. It requires 0.1501 Gm. glucose, represented by  $x$ , to reduce 0.72 Gm.  $\text{HgI}_2$ , whilst of invert-sugar, represented by  $y$ , only 0.1072 Gm. is required. From these figures, the relative value of  $x$  is obtained as 4.79, and that of  $y$  as 6.71.

The amount of sugar estimated by Fehling's solution, and the amount of mercuric iodide reduced by the same quantity of the solution, give the data for estimating the amount of sugar or of sugar and dextrin present. First, the equations  $x + y = 0.2144$  and  $479x + 671y = 1.44$  are formed. By calculation it is found that  $y = 0.2144$  and  $x = 0$ , showing that invert sugar only is present. But this sugar was not present in the original extract, as that did not reduce the test solutions, so it must have been produced from cane sugar, by boiling with hydrochloric acid, or by the body which has an acid reaction.

1 mol. cane sugar— $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ , 342—on boiling with acids is changed to form 2 mol. invert-sugar— $\text{C}_6\text{H}_{12}\text{O}_6$ , 180—by combining with  $\text{H}_2\text{O}$ . According to this, the 0.2144 Gm. invert-sugar is produced from 0.204 Gm. cane-sugar, or 1.02 per cent.

*Cold Water Extract.*—The barley not dissolved by the alcohol was dried, and weighed 7.83 Gm. This was macerated, and percolated with cold water until exhausted. The percolate was concentrated to 40 Cc. and tested with Fehling's solution, which it failed to reduce. After boiling it for two hours with a little dilute sulphuric acid, neutralizing with sodium carbonate, and again testing, it reduced the test solution, showing the presence of 0.206 Gm. sugar. The whole extract was capable of reducing 0.987 Gm.  $\text{HgI}_2$ ,  $x + y = 0.206$  and  $479x + 671y = 0.987$ , showing that the sugar formed by boiling with the acid consisted wholly of glucose, and this was produced from dextrin. Dextrin— $\text{C}_6\text{H}_{10}\text{O}_5$ , 162—when boiled with dilute acids, combines with  $\text{H}_2\text{O}$  to form 1 mol. glucose— $\text{C}_6\text{H}_{12}\text{O}_6$ , 180—so that the amount of glucose was formed from 0.185 Gm. of dextrin.

The remainder of the barley when dried weighed 7.438 Gm., and the extracted matter by water, amounting to 0.392 Gm., consisted of dextrin, proteids and ash.

*Acid Extract.*—The portion not dissolved by the previous treatment was mixed with 200 Cc. water and 5 Cc. sulphuric acid, and boiled for eight hours, water to preserve this quantity being added occasion-



ally. It was thrown upon a filter and thoroughly washed with warm water, and then diluted to 600 Cc. This extract contained all the starch of the barley as glucose. Fehling's solution showed the presence of 6.293 Gm. of the sugar, and with Sachsse's test 30.186 Gm.  $\text{HgI}_2$  were reduced. As starch and dextrin are isomers, the same change took place as was explained under the cold water extract.  $180 : 6.293 :: 162 : x = 5.664$  Gm., the amount of starch in 10 Gm. barley.

Weight of the insoluble portion, when dried, 1.664 Gm. Total acid extract, therefore, 5.774 Gm., and of acid extract not starch, 0.11 Gm.

*Alkali Extract.*—On boiling the above remainder for two hours with 100 Cc. of a 20 per cent. solution of sodium hydrate, filtering, and washing with sufficient water to remove the alkali, the residue after drying weighed 0.746 Gm., making the alkali extract 0.918 Gm., consisting of proteids and ash.

The residue, 0.746 Gm., consisted of crude fibre and ash. To find the amount of pure cellulose it was macerated for 24 hours in a solution of chlorinated soda, washed, dried and weighed. Weight, 0.744 Gm. The ash was estimated by igniting the above in a weighed crucible and weighing the portion not consumed. Ash, 0.024 Gm.; pure cellulose, 0.72 Gm.

On summing up the results of the different operations, the following is produced:

		Calculated as free from moisture.
Moisture.....	11.68	
Ash.....	2.68	3.03
Proteids .....	12.99	14.70
Fat, Resin, etc.....	5.65	6.39
Volatile Oil.....	0.60	0.78
Cane-sugar.....	1.02	1.15
Dextrin.....	1.85	2.09
Starch.....	56.61	64.13
Cellulose.....	7.20	8.15
	100.40	100.42

## CONTRIBUTION TO THE MORE EXACT KNOWLEDGE OF THE CHEMICAL NATURE OF STARCH-GRAINS.

BY B. BRUKNER.

In 1856, Nägeli extracted a substance turned blue by iodine, and termed "granulose," from starch-grains, without, however, destroying their form. In 1859 Jessen found that on rubbing starch-grains with water a portion of the soluble starch was dissolved. Nasse, in 1866, gave the name amidulin to a soluble body obtained from starch-paste. Nägeli, in 1874, extracted by dilute hydrochloric acid a body essentially different from starch, which he called amyloextrin. The first object of the author is to determine the relation existing between these four bodies.

*Amidulin.*—Starch has generally been considered as insoluble in water. Jessen and Delffs, by rubbing starch with water, extracted a portion; this might, however, have been due to the conversion into starch-paste by the heat evolved in the crushing of the granules. W. Nägeli imbedded starch-grains, and then cut sections; the portions of the granules were turned blue by iodine, as also was, to some extent, the small quantity of water employed, and hence a portion must have gone into solution. By rubbing dry starch granules, they may be broken, and, if subsequently treated by water and filtered, they give a clear solution turned blue by iodine. But, on allowing wheaten starch to digest with water for three weeks, filtering, evaporating to one-fifth, and testing with iodine, no blue coloration was obtained; hence it is impossible to extract the inner and soluble starch with water until the outer membrane is either changed or broken: the character of the solution is that of a micellar solution; it is not capable of diffusion. The substance soluble in cold water and colored blue by iodine, the amidulin of Nasse and the granulose of Nägeli, are identical.

*Starch-paste.*—Schimper and Nägeli are not agreed as to the distinction between swollen starch and starch-paste. Between these two states there is no sharp distinction; thus at 46° potato-starch swells distinctly; at 59° it begins to lose its form; and at 62.5° it is converted into a paste, and shows no trace of the original form. After discussing Nägeli's micellar theory, viz., that the smallest particles of starch and similar substances consist not of molecules, but of larger

groups, *i. e.*, micellæ, which, owing to their comparatively slow movements, due to their greater size and weight, easily unite into micellar clusters, the author concludes that swollen starch and starch-paste differ in nothing but the aggregate condition of their micellæ; they differ therefore physically but not chemically, and accordingly starch-paste, amidulin and granulose are identical.

*Erythrogranulose*.—Erythrogranulose and erythrodextrin are the names given to two bodies colored red by iodine (Brücke). By digesting starch solution with diastase, and testing portions from time to time with iodine and with tannin solution, it was shown that so long as iodine produced a blue coloration, tannin produced a precipitate, but with a red coloration no precipitate was formed, nor under these conditions was a precipitate produced by adding hydrochloric acid; hence the red coloration is due to the presence of dextrin. If very dilute iodine be added to starch-granules (or paste) a red color is first produced; this is due to the presence of dextrin (erythrodextrin) and its greater solubility in water.

*Amylodextrin*.—W. Nägeli states that soluble starch is distinguished from amylodextrin by being precipitated from solution by tannin and by lead acetate, and further that freshly precipitated starch is insoluble in water, whilst freshly precipitated amylodextrin is soluble. None of these differences can be confirmed. Further, amylodextrin does not, like starch, swell up with an alkaline solution, but simply dissolves; this, however, is not a distinctive test, since precipitated starch behaves exactly like amylodextrin; amylodextrin is tinted by organic matter just as starch is. It is also stated that Trommer's copper test is not reduced by amidulin, but is by amylodextrin; but it has been shown that the starch-grains themselves contain dextrin, and further, during the progress of the test, the starch becomes converted into dextrin and into sugars, and, still more important, dextrin is formed during the preparation of amylodextrin.

The author has been quite unable to confirm the statement as to the crystalline nature of amylodextrin. Amidulin and amylodextrin are identical. That amydulin—a body not capable of diffusion, can be extracted from starch-grains by dilute acid, is explained by the action of the acid on the micellar aggregates.

*The Iodine Reaction*.—The so-called iodide of starch is no chemical compound; it has been stated to be decomposed when heated; this depends on the affinity of warm water for iodine being greater than

that of cold water; and if this greater absorptive power be satisfied by addition of more iodine, then the blue color is not destroyed even by boiling. The author considers the blue color to be simply due to the solution of iodine in potato-starch, just as violet and brown colors are obtained on solution in chloroform and water respectively. Potato- and arum-starch yield blue colorations, wheat- and rice-starch yield violet, but after boiling they also are turned blue by iodine. Starch-grains have a greater attraction for iodine than unorganized starch; thus a cold clear solution prepared from crushed starch-grains and colored blue by iodine, is completely decolorized by adding whole starch-grains. Similarly, it is shown that starch-grains attract iodine more energetically than dextrin, the red solution being decolorized, and the starch-grains turning blue.

In conclusion, soluble starch, starch-paste, granulose, amidulin and amylopectin are identical, *i. e.*, give identical reactions, as also are erythrogranulose, erythrodextrin and dextrin.—*Jour. Chem. Soc.*, May, 1884, p. 575, from *Monatsh. Chem.*, vol. 4.

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## CONSTITUENTS OF WHITE AGARIC.

By E. JAHNS.

Although the larch agaric (*Polyporus officinalis*) has been investigated by more than one chemist, conflicting statements concerning its constituents still exist. The author, with the view of clearing up the question, has re-investigated this plant. By extraction with hot strong alcohol it yielded about 18 per cent. of a crystalline acid melting at about 139°, and easily soluble in alcohol, glacial acetic acid, and turpentine; less soluble in ether, and nearly insoluble in chloroform, benzene and cold water. The acid is dibasic, forming normal salts with the alkali metals, which are easily soluble in water, and acid salts which are only slightly soluble; with the majority of the metals, it forms insoluble salts, which are precipitated in the amorphous state from aqueous solutions. Analysis showed that *agaricic acid* was a homologue of malic acid, represented by the formula  $C_{16}H_{30}O_5H_2O$ . On oxidation with nitric acid, it is converted into succinic and butyric acids. The principal salts are described in the paper. This acid is identical with the "agaricic acid" of Fleury, the "laricin" of Martius; and the substances named by Schoonbroodt "agaricin" and "pseudo-wax" by Trommsdorff are probably the same acid in an



impure state. The original alcoholic extract of the fungus also yields a substance which crystallizes in needles from a solution in absolute alcohol. It is insoluble in water, and nearly so in ether, chloroform and cold alcohol, but dissolves in potash solution. It melts at about  $272^{\circ}$ , and sublimes in white needles. This substance, which is probably an alcohol, exists to the extent of about 5 per cent. in the plant. The alcoholic mother-liquors from this substance contain a white amorphous body, which is deposited in a colloidal form from its solution in chloroform. It appears to be an acid, and occurs to the extent of about 4 per cent. in the fungus. Finally a red amorphous resin was obtained from the original alcoholic extract, in which it was very soluble. This is the bitter purgative constituent of the fungus, and is present to the extent of about 30 per cent.—*Jour. Chem. Soc.*, March, 1884, p. 353, from *Arch. Pharm.*, vol. 21.

## CODEINE HYDROBROMIDE.

BY D. B. DOTT.

Codeine is the strongest of the opium bases, replacing all the others in solution of their salts. Yet probably for more than one reason, the salts of codeine are not much in demand, the alkaloid itself being more generally used. As the hydrobromide is sometimes required, I thought that a note of its principal properties might be of some interest, especially as the salt has not been previously described, at least so far as I have observed.

Codeine hydrobromide crystallizes from an aqueous solution in radiate tufts of four-sided prisms. The solubility in water was determined by digestion at a temperature below  $60^{\circ}\text{F}$ . for twenty-four hours, then at  $60^{\circ}$  for two hours, when portions of the solution were weighed and evaporated to dryness on a water-bath.

a. 165 grs. solution left 1.93 grs. = 1.97 grs. 2 — hydrate.

$$\frac{165 - 1.97}{1.97} = 82.75.$$

b. 144.25 grs. left 1.70 = 1.73 grs. 2 — hydrate.

$$\frac{144.25 - 1.73}{1.73} = 82.38.$$

The solubility in water at  $60^{\circ}\text{F}$ . is, therefore approximately 1 in 82.5.

With the heat of a water-bath 8.04 grs. of the air-dry salt lost 0.17 gr. = 2.11 per cent.  $C_{13}H_{21}NO_3.HBr.2H_2O = 2.16$  per cent. for  $\frac{1}{2} H_2O$ . In the air-bath at  $115^\circ C$ . 5.74 grs. lost 0.485 gr. = 8.44 per cent.  $C_{13}H_{21}NO_3.HBr.2H_2O = 8.65$  per cent. for  $2H_2O$ . It is, therefore, evident that the hydrobromide like the hydrochloride loses a fourth part of its combined water at the temperature of the water-bath, and the remainder at some temperature above  $100^\circ$ . But we must not deal in fractions of molecules, so we ought to write the formula  $(C_{13}H_{21}NO_3.HBr)_2.4H_2O$ , or more accurately (having in view the researches of Dr. Wright),  $C_{36}H_{42}N_2O_6.2HBr.4H_2O$ . We may, of course, use the empirical formula when more convenient, just as we sometimes write the erroneous expression  $FeCl_3$  instead of  $Fe_2Cl_6$ . —*Pharm. Jour. and Trans.*, May, 17, 1884, p. 917.

## ALKALOIDS OF *ANGUSTURA BARK*.

BY KOERNER AND C. BÖHRINGER.

In this preliminary notice the authors, after some historical details as to the introduction of the bark, state that it contains aromatic substances and several alkaloids, the amount of the latter varying in different specimens from 0.8 to 1 per cent. The alkaloids are mostly in the free state, and may be extracted directly from the bark by means of ether. After the ethereal extract has been washed with dilute potash solution, the addition of oxalic acid or dilute sulphuric acid gives a yellow crystalline precipitate of the corresponding salt of one of the alkaloids, *cusparine*, whilst other alkaloidal salts remain in solution.

The precipitated cusparine salt is moderately soluble in boiling alcohol, and, on cooling, crystallizes out in slender needles of a magnificent greenish yellow; this color is not removed by repeated crystallization, or by treatment with animal charcoal, and other salts of the alkaloid, obtained from the yellow precipitate by decomposition, are also intensely yellow. If, however, the free cusparine,  $C_{19}H_{17}NO_3$ , obtained from these colored salts, is crystallized several times from light petroleum, and then reconverted into the salt, this is found to be colorless. The author has been unable to ascertain the cause of this yellow coloration. The alkaloid crystallizes from light petroleum in tufts of slender needles melting at  $92^\circ$ ; it is moderately soluble in ether, more readily in alcohol. The sulphate, oxalate and hydrochlo-

ride of the base are but sparingly soluble in water; the acetate is much more soluble, but the solution is decomposed if largely diluted; the tartrate dissolves readily. The platinochloride was obtained as an orange-yellow crystalline precipitate.

When treated with potassium hydroxide, cusparine splits up, yielding a new alkaloid and the potassium salt of an acid which seems to be an aromatic derivative; the acid is sparingly soluble and crystallizes readily. The alkaloid crystallizes from alcohol, in which it is very sparingly soluble, in minute, very brilliant, colorless needles; it decomposes at  $250^{\circ}$  without melting. An attempt to decompose the cusparine in a similar manner by the action of hydrochloric acid failed, as it began to carbonize even at  $100^{\circ}$ .

In the mother-liquors from which the cusparine was originally precipitated as sulphate, or oxalate, another alkaloid is found, to which the authors have given the name *galipeïne*,  $C_{20}H_{21}NO_3$ . The free base crystallizes from light petroleum in white needles melting at  $115.5^{\circ}$ . It may be obtained in well-formed transparent prisms from its solution in ether or alcohol. All the salts of this alkaloid are more soluble than those of cusparine; several of them are of a magnificent greenish yellow like uranium salts. The sulphate crystallizes in large prisms with 7 mols.  $H_2O$ , which it loses in part on exposure to the air; it melts at  $15^{\circ}$ , and at  $100^{\circ}$  undergoes decomposition, yielding the sulphate of another alkaloid and a crystalline nitrogenous substance which melts at  $196^{\circ}$ . The platinochloride crystallizes in prisms with a triangular base.

Besides cusparine and galipeïne, the authors have found another alkaloid which melts at  $180^{\circ}$ , and is very sparingly soluble in ether. It crystallizes from alcohol and furnishes salts, the solutions of which have a blue fluorescence.

The property these alkaloids have of being transformed into other alkaloids with simultaneous formation of acids, is interesting, and may throw some light on the constitution of vegetable alkaloids in general.—*Jour. Chem. Soc.*, March, 1884, p. 341, from *Gazzetta*, vol. 13.

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NICOTINE AND ALCOHOL ANTIDOTAL TO STRYCHNINE.—Prof. Haughton, of Dublin, relates a case of strychnine poisoning which was treated by drop doses of nicotine in whisky punch every half hour. At the second dose the paroxysms became less violent and the muscles of the abdomen softer.—*Med. Annals*.

## THE ESSENTIAL OILS OF *BLUMEA LACERA*, DC., AND *SPHÆRANTHUS INDICUS*, LINN.

BY W. DYMCK.

These two plants attract attention in India during the cold weather by their abundance on waste ground and in fields after the harvesting of the rice crop. The *Blumea* has a powerful camphoraceous odor, and *Sphaeranthus indicus* a rose-like perfume.

*B. lacera* is a perennial plant, with obovate, deeply serrated leaves and yellow groundsel-like flowers, the whole plant being thickly clothed with long silky hairs. The natives of the Concan, near Bombay, call it *Nimúrdi*, and make use of it to drive away fleas and other insects. One hundred and fifty lbs. of the fresh herb in flower was submitted to distillation in the usual manner with water, and yielded about 2 ounces of a light yellow essential oil, having a specific gravity of 0.9144 at 80°F., and an extraordinary rotating power, 100 mm. turning the ray 66° to the left. Mr. D. S. Kemp, who made the observation, checked it by examining a 10 per cent. solution in alcohol, which gave 6.6.

This *Blumea* is of interest as the possible source of an insect powder. I am forwarding a supply of the plant and a specimen of the oil to Mr. Holmes for experiment and also for identification, as the genus is a difficult one.

*Sphaeranthus indicus* is an annual with sessile, decurrent, obovate, bristly serrate, downy, glutinous leaves, and globular heads of purple flowers. It is a well-known Indian medicine, under the names of *Mándi*, *Gorakhmándi*, *Munditika*, *Murmuria* and *Kottak-karandai*, and is reputed to be a general tonic, deobstruent, alterative and aphrodisiac. The distilled water is recommended for use and also the root. One hundred and fifty lbs. of the fresh herb was distilled with water in the usual manner and yielded a very deep sherry colored, viscid essential oil, very soluble in water, and clinging to the side of the vessel, so that only half an ounce could be collected. The oil does not appear to have any rotatory power, but it is difficult to examine on account of its opacity.—*Parm. Jour. and Trans.*, June, 7, 1884, p. 985.

Bombay, May 1, 1884.



SPIRITUS ÆTHERIS NITROSI: COMPOSITION IN RELATION TO DETERIORATION.<sup>1</sup>

BY PETR MACEWAN.

"What this spirit is," says Professor Redwood,<sup>2</sup> "has hitherto eluded investigations; it contains nitrite of ethyl, aldehyde, and probably other compounds, but in what proportion it is extremely difficult to indicate, all that we can say is that it always contains the same proportion of the same ingredients."

Recognizing fully the difficulty here alluded to, it is with some hesitancy that I approach the subject, for though Professor Redwood made this statement about six years ago little has been done to increase our knowledge of the complex mixture, spiritus ætheris nitrosi. True, pharmaceutical literature published since then shows that it does not "always contain the same proportion of the same ingredients," and the reason why was very clearly shown in the discussion which followed Mr. Abraham's paper at the Southport meeting of the Pharmaceutical Conference. This paper is not intended to add to our knowledge of the composition; I can only consider it as a preliminary statement of the work which I have been enabled to do in the subject. Without entering, therefore, into the question of the "other compounds," I meanwhile propose to discuss the composition as related to deterioration; that is, the existence in the spirit of ethyl nitrite and aldehyde and the influence they exert in causing deterioration. Taking the official spirit as our standard we find that our opinion is fairly agreed as to ethyl nitrite and aldehyde being always present in it. Their presence can very readily be demonstrated, as by the tests which I show you.

*Proportion of Ethyl Nitrite in the Spirit.*—Were all the nitric acid ordered in the official process reacting with the alcohol to form only ethyl nitrite ( $C_2H_5NO_2$ ), we should expect to find somewhat over 6·5 per cent. in the finished spirit; but in practice we find that the theoretical yield is not obtained, and only with extreme care can we obtain a product containing 4 per cent. of ethyl nitrite. There is really no authoritative standard to go upon, the Pharmacopœia tests being empirical, but Dr. Dupré, in a paper<sup>3</sup> read before the Society of Public Analysts,

<sup>1</sup> Read at an Evening Meeting of the North British Branch of the Pharmaceutical Society, March 19, 1884.

<sup>2</sup> "Pharm. Jour." [3], viii, 377.

<sup>3</sup> "Pharm. Jour." [3], x, 93.

stated that spirit containing 3 per cent. of ethyl nitrite fairly represented the B.P. preparation. This percentage is a fair one, and as Dr. Dupré's work has been the "guiding star" of public analysts, we may accept his standard, especially since the experience of practical pharmacists sufficiently justifies it. Mr. Symons having so recently shown ("Pharm. Jour.," Oct. 13, 1883) the quality of commercial spt. æther. nit., I have not attempted the collection of similar information. It was necessary, however, to determine the amount of ethyl nitrite present as deterioration proceeded, and for this purpose Eykman's method was adopted, others having proved uncertain. It will be seen from the table which I give further on that as high as 3.54 per cent. of ethyl nitrite was found, free nitrous acid not being included in the percentage.

*The Aldehyde Content.*—Aldehyde has generally been looked upon as an unavoidable contamination, and one of the objects aimed at by Professor Redwood in devising the official process was to minimize the yield of this compound. The percentage of it present in the spirit is variable, and as it is closely associated with ethyl nitrite in deterioration, I shall consider it in the paragraph on *development of acidity*. In the distillate of the Pharmacopœia process I have not found higher than 2 per cent. It may be stated that the method of estimation adopted was that devised by Dr. Thresh,<sup>1</sup> which is based on the formation of aldehyde resin with excess of caustic soda solution, the colored solution formed being diluted to the tint of a standard aldehyde resin solution, and compared as in nesslerizing. From 5 to 10 cc. of the spirit may be used. The method gives fairly constant results, and though they may be approximate, still they are much more constant than those given by Mr. Rimmington's method,<sup>2</sup> which depends on oxidation of the aldehyde with hydroxyl solution and subsequent titration with standard alkali. The weakness here is that the acidity produced depends on more than aldehyde.

These two bodies, ethyl nitrite and aldehyde, are the leading factors in determining the deterioration of spiritus ætheris nitrosi, another being their solvent, rectified spirit, a mixture of alcohol and water. The decomposition which results in the mixture of these three bodies is attended by at least three marked changes which can be physically and chemically determined:

<sup>1</sup> "Pharm. Jour." [3], ix, 409.

<sup>2</sup> "Pharm. Jour." [3], x, 41.

1st. Increase of specific gravity.

2d. Diminution of the volume of ethereal liquid separated by saturated chloride of calcium solution.

3d. Development of acidity.

The extent of these changes we shall consider in their order.

*Increase of Specific Gravity.*—In the following table I give results of observations. I. to V. are B.P. spirit made by myself or procured as such. VI. is spirit answering B.P. tests raised to .850 with water, and VII. is the .850 of London Pharmacopœia.

	Made.	When examined.	Sp. gr. 50° F.
I.	Not known.	May, 1883.	.848
I.	Not known.	March, 1884.	.853
II.	Not known.	May 1883.	.852
II.	Not known.	March, 1884.	.8576
III.	Nov., 1883.	March, 1884.	.852
IV.	Received Nov., 1883.	March, 1884.	.8516
V.	Feb. 14, 1884.	Feb. 14, 1884.	.846
V.	Feb. 14, 1884.	Feb. 21, 1884.	.850
V.	Feb. 14, 1884.	March, 7, 1884.	.8516
VI.	Feb. 15, 1884.	March 7, 1884.	.8536
VII.	Received Nov., 1883.	Feb. 14, 1884.	.856
VII.	Received Nov., 1883.	March 7, 1884.	.859

*Diminution of Separation Volume.*—In this I give the result of examination of two specimens of the B.P. spirit kept under different conditions,  $\alpha$  in a well stoppered and almost full bottle, which was opened frequently, and  $\beta$  kept in a badly stoppered bottle, half full, and between the second and third observations the stopper was accidentally left out over a night.

$\alpha$ . February 14.	2 p. c.	$\beta$ . February 14.	2 p. c.
February 21.	1.75 p. c.	February 18.	1.33 p. c.
March 7.	1.33 p. c.	February 21.	Nil.

It will be convenient to reserve remarks on these observations until we consider:

*The Development of Acidity.*—The free acids existing in the spirit are acetic and nitrous acids. It has been stated that nitric acid is also present, but the ordinary methods for determining the existence of

nitric acid in presence of the nitrous, are inapplicable in this case. It is questionable, however, if nitric acid can exist as such in presence of the readily oxidizable constituents of the spirit. I have therefore calculated the inorganic acid as nitrous acid ( $\text{HNO}_2$ ).

The free acids were determined volumetrically,<sup>1</sup> semi-normal solution of soda was used, methyl orange being taken to indicate nitrous acid and phenolphthalein to indicate total acidity. The method is certainly not free from objection, the sources of error being (1) decomposition—that is, further acidity—of the spirit during the estimation, and (2) decomposition of the methyl orange by free nitrous acid. The first error can be limited by rapid manipulation, use of undiluted spirit and a small flask. The second is not so rapid in its action as to preclude indication, and by using the methyl orange externally as well as internally, the error is minimized. In the method we take 10 cc. of the spirit, which is put into a 50 cc. flask, in which a drop of phenolphthalein has previously been put, then two or three drops of methyl orange solution are put in. Before the estimation is commenced several spots of methyl orange solution are placed on a white plate, and a glass rod should be at hand. The standard solution is quickly but carefully dropped into the flask, and as soon as the red color of the methyl orange begins to fade, the glass rod should be dipped in and brought into contact with a methyl orange spot on the plate. If the spot assume a strong pink color, we have an indication that the nitrous acid is not quite neutralized, so the addition of standard solution is continued until the methyl orange spot becomes but feebly pink. The volume of standard solution used is noted, and the titration continued until the phenolphthalein indicates alkalinity. The first portion used is calculated for nitrous acid and the second for acetic acid.

In the following table the results of several observations are given in percentages, the proportion of ethyl nitrite and aldehyde (as far as determined) being also given. I. to IV. are B.B. spirit ( $\alpha$  and  $\beta$  of the separation paragraph are II. and III.); VII. is B.P. raised to .850, and the others are the .850 of Lond. Phar.

Having before us these tabulated results of the effect of deterioration on the specific gravity, separation volume and acidity of the spirit, we may now discuss the causes of decomposition and deterioration.

<sup>1</sup> In Mr. Rimmington's method the spirit is unduly exposed to atmospheric influence and the action of water.



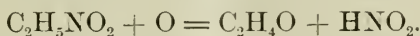
	Date or age.	$\text{HNO}_2$	$\text{HC}_2\text{H}_3\text{O}_2$	$\text{C}_2\text{H}_5\text{NO}_2$	$\text{C}_2\text{H}_4\text{O}$
I.	May, 1883.	0.47	1.20	0.87	0.80
I.	March, 1883.	0.773	0.329	0.095	2.50
II.	One week	0.215	0.206	3.51	0.85
II.	Two weeks.	0.257	0.247	.....	0.95
II.	Three weeks.	0.274	0.349	3.14	
III.	Two days.	.....	.....	2.01	0.80
III.	Four days.	0.24	0.216	.....	1.14
III.	One week.	0.322	0.246	1.24	2.00
IV.	One month.	0.247	0.411	1.93	1.67
V.	Four months.	0.161	0.288	3.53	1.5
VI.	Four months.	0.352	0.494	1.64	1.426
VII.	Four months.	0.418	0.206	0.92	2.5
VIII.	Four months.	0.194	0.247	0.22	0.2
IX.	As received.	0.188	0.42	.....	

Ethyl nitrite, it is well known, is a very volatile fluid, and if the spirit be stored in imperfectly closed bottles, considerable loss will result from evaporation. But this does not account for the specific gravity, for since ethyl nitrite is of greater density than *spt. aether. nit.*, the loss by evaporation would tend to decrease rather than increase the density of the spirit. Although Dr. Dupré has stated (see paper quoted) that the acidity of the official spirit is not due to decomposition of ethyl nitrite, yet all pharmacists who have studied this subject have recognized the text-book statement, that the water contained in the rectified spirit used in the preparation reacts with the ethyl nitrite to form alcohol and nitrous acid. A further change takes place in which acetic acid is one of the products, and since the aqueous solutions of these acids are supernormal, they will tend to increase the specific gravity, and as ethyl nitrite disappears in their formation, the separation volume necessarily decreases. Independent of the reaction between water and ethyl nitrite another reaction takes place, in which acetic acid is formed. What is this reaction? Oxidation of aldehyde, is a natural reply, and to this oxidation the formation has generally been attributed. But it will be observed from the acidity table that aldehyde is an *increasing* rather than *decreasing factor*, as we should in these circumstances expect. This is particularly observable in the case

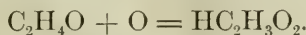
of III., which decomposed rapidly. Without denying that the formation of acetic acid is due in part to oxidation of aldehyde, it must be admitted that another explanation is required. Rapid decomposition is the result of atmospheric influence, and is analogous to the observed fact that the spirit decomposes much more rapidly in partially filled bottles than in full bottles. This observation leads us to infer that part, at least, of the acetic acid is due to oxidation of ethyl nitrite. This oxidation might be expressed in one formula, in which acetic and nitrous acids are formed :



We may also express this in two stages ; in the first we have aldehyde and nitrous acid formed :



In the second the aldehyde is oxidized to acetic acid :



It should be further noted that in spite of the greatest care a little nitrous fumes pass over with the distillate in the course of preparation ; this admixture, though minute, is sufficient to act as a nucleus, and hence another cause of decomposition under the best conditions for preservation. The effect of water in influencing decomposition is well seen in the case of VII., which contains additional water. The disappearance of acetic acid in the case of I. is probably due to combination between the ethyl radical and it, acetic ether being formed.

Increase in aldehyde may be due to such a reaction as that expressed in the first stage of the formula given, effected either by direct oxidation or by the action of nitrogen acids upon ethyl compounds. An explanation which is not without interest, though purely suggestive, is that it is due to depolymerization of paraldehyde. You are aware that Mr. Williams stated at Southport that he had a strong suspicion that sweet spirit of nitre contains paraldehyde, which he says is formed during the ordinary process adopted in making the spirit. Well, assuming that paraldehyde (boiling at  $124^\circ\text{C}.$ ) is capable of passing over with the distillate between  $70^\circ$  and  $80^\circ\text{C}.$ , we would expect that the action of nascent nitrous acid would be to resolve it into aldehyde, and hence an increase. I show you some "pure paraldehyde" which has been so treated and you will notice that the pleasant odor of paraldehyde has been replaced by the pungency of aldehyde, and it

gives the aldehyde resin reaction, whereas the untreated paraldehyde does not.<sup>1</sup> If I have the opportunity of making a further communication on this subject, I shall return to this question of the increase of aldehyde.

In conclusion I may be allowed a few remarks on the relation which these results have to everyday pharmacy. I have been partly led to make this communication from the continually reiterated statement that "spt. aether. nit., B. P., is quite unfit for use," and that "the '850 spirit keeps much better," the inference being that the latter is the better preparation. If any proof to the contrary is required we have it in Mr. Symons's paper, in which he gives the result of analysis of six samples of the '850 article, only two of which indicated over 1 per cent. of ethyl nitrite and two were under 0.4 per cent.,—these percentages including free acid. In the course of this paper results of experiments with the '850 spirit are given, and it will be seen that it is subject to increase of density and acidification,—of course, this spirit never gives a separation. Now, the arguments used against the official spirit are, 1st, that the public will not have it, and 2d, that its acidity renders it unfit for dispensing. The first argument is certainly serious looking, but a number of pharmacists tell me that they never have kept anything but the official spirit, and their experience is that after a series of explanations to their customers they will have nothing else, which is a very wise decision on the part of the customers. To discard the spirit on account of the second argument is of course absurd, for we are legally required to use only the official spirit in compounding physicians' prescriptions. Practically, however, the objection is merely one of degree. In the common '850 spirit, the acidity is less, because the ethyl nitrite content is extremely small; if pharmacists, therefore, prefer to keep this spirit on account of a vague idea that it is a "better keeping" one, they assume a very serious responsibility. The proportion of ethyl nitrite in the official spirit might no doubt be judiciously decreased and fixed, but even though it were fixed at 2 per cent., it is evident that the objection would only be lessened and not removed. It is, therefore, left to the pharmacist to control deterioration by careful storage of his stock. Hydrocyanic acid is kept in small phials, so that it may not deteriorate; so might we keep spt. aether. nit. in proportionately smaller bottles than at present, with equal care.

<sup>1</sup> On this point see abstract of article by A. P. N. Franchimont, "*Journ. Chem. Soc.*," xliv., 453.

The shop round need not be of the largest series or nearest the shop window, and stored stock should certainly not be kept in partially filled Winchester's, nor need we lay in a stock which will serve the better part of the solar year.

For the purposes of this investigation, Messrs. J. F. Macfarlan & Co. have liberally supplied me with spt. æther. nit., B. P., and other material, for which I desire to thank them. My thanks are also due to Mr. Dott for much technical information.--*Phar. Jour. and Trans.*, April 12, 1884, p. 817.

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### SPIRIT OF NITROUS ETHER.<sup>1</sup>

BY D. B. DOTT, F. R. S. E.

In this paper on sweet spirit of nitre I have no intention of taking up the slippery subject of its composition and transformations, which Mr. MacEwan has been bold enough to tackle; but am only desirous of discussing the characters and tests of this important preparation. Before doing so, however, it is necessary to refer briefly to what is known of its composition, in order that we may decide what tests it ought to answer. To fix exactly the composition of sweet spirit of nitre is doubtless a problem beyond the attainments of chemical analysis, but there is no reason why we should not have a better knowledge of its chemistry than we at present possess. We may safely say that ethyl nitrite, acetic aldehyde, nitrous and acetic acids, and ethyl acetate, are normal constituents of spiritus ætheris nitrosi. It has been almost universally recognized that the value of the preparation depends on the presence of the nitrite, though this has been doubted by a few writers. Among these is Mr. Abraham, of Liverpool, who believes the aldehyde to be the active ingredient. According to this view the aldehyde is oxidized to acetic acid, which forms acetates with the alkalies of the blood, whereupon the physiological effects are manifested. If I rightly follow this train of reasoning, it would appear that one may as well swallow a little vinegar as take a dose of sweet spirit of nitre. Not being a pharmacologist, I wrote to Professor Matthew Hay, of Aberdeen, on the matter, and have received from him a very interesting letter, from which I cannot do better than quote a few sentences.

<sup>1</sup> Read at an Evening Meeting of the North British Branch of the Pharmaceutical Society, March 19, 1884.



"With regard to aldehyde, I cannot at the present moment recall having seen any notice of its physiological action. I rather think it has not to any extent been investigated. But although that is probably so, I am fairly certain, judging from its chemical relationship to alcohol and the ethers, that in action it will differ to no great extent from these."

"With regard to the sweet spirit of nitre, my opinion is this, that its most active ingredient ought to be the nitrite of ethyl, which it is believed to contain, to, I think, the extent of 2 per cent. But so far as my observation carries me, nitrite of ethyl is present in very variable quantity in the ordinary spirit of nitrous ether, and is sometimes hardly to be detected at all. The nitrite is very active even in very small quantity; and, I believe that if a preparation of spirit. æth. nit. could be obtained containing a constant proportion of nitrite of ethyl, it would be a great gain to practical pharmacy and to therapeutics. The unreliability of the common forms of it has, I believe, led largely in recent years to its disuse."

"Murrell states that nitroglycerin is powerfully diuretic, and I have shown that nitroglycerin is decomposed into nitrite in blood, hence its physiological action—hence diuresis."

I am glad to have my own opinion confirmed by so eminent an authority. We may, therefore, conclude that the right means of estimating a sample of spirits of nitre is to determine the amount of nitrous ether, or rather, of nitrous acid, which it contains. I am far from denying that the medicinal value of the spirit may be materially enhanced by the aldehyde and acetic ether, but these may be regarded as quite subordinate. Besides, it is difficult to estimate their amount.

Let us now consider, one by one, the tests of the British Pharmacopœia. Firstly, we have the specific gravity, which is given as .845, at 60° F. This is really only a safeguard against admixture with water, though there is a delusion, still to some extent prevalent, that the .850 must be a better article than the .845. Doubtless this has arisen from the fact that nitrous ether has a greater density than rectified spirit. It has therefore been supposed that a preparation rich in nitrous ether will have a high specific gravity, but this is a mistake; for it is easy to prepare a spirit fully up to the Pharmacopœia requirements with a specific gravity even less than .845. According to our experience a high specific gravity just means so much the more water, and if one fact regarding spirit of nitre has been proved more con-

clusively than another, it is, that water encourages the decomposition of the ether. Whence it is manifest that the specific gravity ought to be kept as low as possible consistent with the due proportion of ethyl nitrite.

Secondly, "it effervesces feebly or not at all when shaken with a little bicarbonate of potash." Not much can be said against this test, though it is perhaps a little indefinite. It might be better to have a limit fixed to the amount of free acid, the same to be determined by standard alkali—but this is doubtful.

Thirdly, "if it be agitated with twice its volume of saturated solution of chloride of calcium in a closed tube, 2 per cent. of its original volume will separate in the form of nitrous ether and rise to the surface of the mixture." This test has given rise to much controversy. It belongs to the class of inaccurate empirical tests, which are always unsatisfactory, though sometimes tolerable when nothing better can be obtained. Chemists have all recognized that the "ethereal fluid," which separates under the above circumstances, is not ethyl nitrite, but a solution of the same, of variable strength. It is probably just as well that it is so, especially when the testing is performed on a warm summer day. Judging from some estimations which I made by the method subsequently described, this etheric fluid would seem to contain from 50 per cent. to 60 per cent. of nitrous ether. Professor Attfield<sup>1</sup> says that it contains less than half its bulk of ethyl nitrite. Professor Redwood<sup>2</sup> is responsible for the generally accepted belief that 2 per cent. of separation indicates 10 per cent. of ether. If made regarding the "ethereal fluid," which actually separates, the statement may be fairly correct, but it is quite untrue if applied to a 10 per cent. solution of ethyl nitrite in spirit. Such a solution will separate more than half its contained ether when agitated with solution of calcium chloride. I have tried many experiments with this test, but it would be superfluous to detail them. Suffice it to say that there are three main factors which determine the amount separated:—

- 1st. The composition of the spirit.
- 2d. The temperature.
- 3d. The dimensions of the tube.

Regarding the first of these I would only remark that if the spirit

<sup>1</sup> "Pharm. Journ.," [3], viii., 378.

<sup>2</sup> "Pharm. Journ.," [2], viii., 508.

is watery it will give a better result, *ceteris paribus*, than one containing less water. It will readily be understood that with a compound having so low a boiling point, and so high a vapor pressure at ordinary temperatures as nitrous ether, the proportion separated by chloride of calcium solution must be much affected by the second and third of these causes; *e.g.*, 15 cc. of spiritus ætheris nitrosi at 48°F., shaken up with two vols. solution of calcic chloride at same temp., gave a separation of 0.4 cc. When the experiment was repeated with the spiritus and chloride solution at the temp. of 68°F., separation of only 0.2 cc. was obtained. By using a capacious tube in one case, and in another a small tube which the mixture nearly filled, results almost as variable were observed. It may here be noted that the "ethereal fluid" takes some time to separate, the process being seldom complete in less than half an hour. The greatest objection to this test is, however, the well-known fact that a genuine preparation will after a certain time, and while still retaining its medicinal virtues, fail to give any separated "ether" when agitated with solution of chloride of calcium. Taking all the facts into consideration, I am clearly of opinion that this separation test ought to be abolished.

What we require is a test which shall show at least approximately the value of the preparation, by means of reagents and apparatus at the disposal of every pharmacist. This must be done by estimating the nitrous acid, whether it exists as such or potentially. There does not appear to be any reason for making a separate determination of the percentage of uncombined nitrous acid, which no doubt contributes its share to the physiological action of the substance. Of the many methods which have been proposed for the purpose of this estimation, probably the best is that devised by Professor Eykman, of Tokio. Not that I regard his process as perfect, because I believe it gives results distinctly under the truth, and of course it includes the nitric acid should any be present. The fatal objection to Eykman's process as a pharmacopœial test is the elaborate apparatus and nicety of manipulation required. It is, in short, better adapted for the laboratory of the analyst than for the pharmacy; and as all the official tests ought to be as simple as possible, we must endeavor to find an easier method. I have tried a great number of experiments with this object, and have to confess that the result after all is not a complete success. The old method of saponifying with caustic soda, and after evaporation of the alcohol, titrating with permanganate, was found to yield very variable

results. This is not surprising considering the facility with which potassic permanganate is reduced, and the certainty that there are organic compounds present after evaporation even to dryness. Oxidation of ferrous sulphate was next tried, but from the difficulty of estimating the excess of ferrous salt in the presence of alcohol, and from other causes, the process proved abortive. Volumetric solution of urea was then employed, iodized starch solution being used to indicate the end of the reaction, but this plan proved entirely unsuccessful, chiefly on account of the impossibility of observing a definite end-point. Possibly, however, the urea method might be made available by measuring the N, or weighing the CO<sub>2</sub> evolved; that is to say if the reaction goes as it ought.  $\text{CON}_2\text{H}_4 + 2\text{HNO}_2 = \text{CO}_2 + \text{N}_4 + 3\text{H}_2\text{O}$ .

The nitrous ether might possibly be estimated by reducing with hydric sulphide, but I have not had time to thoroughly examine this reaction. The few experiments I have been able to perform with it did not yield promising results.

After innumerable experiments I have been compelled to return to the method which suggested itself to me first of all, viz., the liberation of iodine from potassic iodide, and titration of the iodine with sodium thiosulphate. The only mention I have seen of the use of potassium iodide as a means of estimating spiritus ætheris nitrosi, is reported in the "Pharmaceutical Journal."<sup>1</sup> In the discussion after the reading of Dr. Dupré's paper, Mr. Hehner suggested the use of iodide of potassium added directly, with addition of acetic acid, which was thought a good idea. The process is so obvious, that it has probably often been tried and abandoned, which would not be surprising, as without particular precautions it yields results which have no resemblance to the truth. In endeavoring to put this test into practical form, I very soon found that the only way of arriving at right results was to work with a solution of ethyl nitrite of known strength; at least in the first place. We therefore purified some of the nitrite by a method similar to that described by Mr. Williams.<sup>2</sup> At 60° F. it had a specific gravity of .901 (or thereby). Mr. Williams gives the gravity as .937, but states no temperature. At all events, though it was not analysed, I am confident that it must have been very nearly pure. Ten cc. were diluted to 100 cc. with "absolute" alcohol, and this solution was used in the experiments.

<sup>1</sup> [3], x., 93.

<sup>2</sup> "Pharm. Journ.," [3], viii., 442.



It would be tedious to describe the different devices that have been tried, to ensure, if possible, an accurate result. Suffice it to say, that as an inference from numerous experiments, the following method was adopted as the best:—Let 1 gram of iodide of potassium be dissolved in 10 c.c. of water. Then add 20 cc. of rectified spirit, and to the solution so obtained add 5 cc. of the spirit to be tested. Now pour in 5 cc. dilute sulphuric acid, and allow to stand for an hour, then titrate with standard thiosulphate. The operation is best conducted in an eight ounce porcelain basin. The following are some of the results obtained:—

(5 cc. used in each case.)	$\frac{1}{10}$ $\text{Na}_2\text{S}_2\text{O}_3$ solution.	$\text{EtNO}_2$ grams.	$\text{EtNO}_2$ (vol.) per cent.
(a.) 10 per cent. (vol.) solution in alcohol.....	59.5 cc.	= .446	= 9.91
(a.) 10 per cent. (vol.) solution in alcohol.....	59.8 cc.	= .448	= 9.96
(a.) 10 per cent. (vol.) solution in alcohol.....	60.0 cc.	= .450	= 10.00
(b.) Sple. sp. æth. nit. (recent).....	26.5 cc.	= .198	= 4.41
(b.) Sple. sp. æth. nit. (recent).....	26.8 cc.	= .201	= 4.46
(c.) Sple. sp. æth. nit. (four months) .....	23.5 cc.	= .176	= 3.91
(c.) Sple. sp. æth. nit. (four months).....	24.0 cc.	= .180	= 4.00

Although formerly indicated, it may again be noted that the total nitrous acid is given as ethyl nitrite. The older sample contained much more free acid than the fresh one. The method employed is evidently only approximate, but it may serve until something better is devised. It has, at any rate, the advantage of requiring only such apparatus and reagents as are in common use.

Before concluding, I would venture to express a hope that the compilers of the next pharmacopœia will fix a fair standard of purity for spirit of nitrous ether, so that no departure therefrom will be allowed. We sometimes hear the fallacy propounded, that an inferior preparation must be excused, because, at some time or other, it has been produced by the official process. This is an entire mistake. Not only must the official process be followed, but it must be so conducted as to produce a right result, and the product must be so preserved as to be of proper strength when required for use. Yet, as the pharmacopœia requires of pharmacists preparations of a certain degree of purity, so pharmacists require of the pharmacopœia processes and tests which are reasonable.—*Phar. Jour. and Trans.*, April 12, 1884, p. 819.

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A SOLUTION OF GALLIC ACID may be made according to Dr. F. Long ("Brit. Med. Jour.") by means of potassium citrate. Using 15 grains of each, the mixture will dissolve in 1 ounce of water.

## OLIVE OIL AND ITS PRODUCTION.

The following particulars with regard to the production of olive oil in Tuscany have been furnished to Mr. Consul Inglis by one of the principal exporters in Leghorn :

The olive oil produced in Tuscany from the first pressing of the fruit is intended for consumption as an article of food. Hence, great attention is paid both to the culture of the olive tree and the process of making oil.

The olive crop is subject to many vicissitudes, and is an uncertain one. It may be taken as a rule that a good crop does not occur more frequently than once in three years. A prolonged drought in summer may cause the greater part of the small fruit to fall off the trees. A warm and wet autumn will subject the fruit to the ravages of a maggot or worm, which eats its way into it. Fruit thus injured falls to the ground prematurely, and the oil made from it is of very bad quality, being nauseous in taste and somewhat thick and viscous. Frost following immediately on a fall of snow or sleet, when the trees are still wet, will irretrievably damage the fruit, causing it to shrivel up and greatly diminishing the yield of oil, while the oil itself has a dark color, and loses its delicate flavor.

The olive tree in Tuscany generally blossoms in April. By November the fruit has attained its full size, though not full maturity, and the olive harvest generally commences then. The fruit, generally speaking is gathered as it falls to the ground, either from ripeness or in windy weather. In some districts, however, and when the crop is short, the practice is to strip the fruit from the trees early in the season. When there is a full crop the harvest lasts many months, and may not be finished till the end of May, as the fruit does not all ripen simultaneously. Oil made early in the season has a deeper color, and is distinguished by a fruity flavor, with a certain degree of pungency ; while as the season advances it becomes lighter in color, thinner in body, and milder and sweeter in taste. Oil made towards the close of the harvest in April or May from extremely ripe fruit is of a very pale straw color, mild and sweet to the taste, though sometimes, if the fruit has remained too long on the trees, it may be slightly rancid. Oil very light in color is much prized in certain countries, notably France ; and hence, if it also possesses good quality, commands a higher price in the Tuscan markets.

The fruit of the olive tree varies just as much in quality as does the grape, according to the species of the tree itself, the nature of the soil, exposure, and climate of the locality where it grows. Some varieties of the olive tree largely grown, because thought to be better suited to the special conditions of some districts, yield a fruit which imparts a bitter taste to the oil made from it ; such oil, even when otherwise perfect, ranks as a second rate quality. The highest quality of oil can only be obtained when the fruit is perfectly and uniformly sound, well ripened, gathered as soon as it has dropped from the trees, and crushed immediately with great attention. Should the fruit remain any time on the ground, particularly during wet weather, it deteriorates fast and gets an earthy taste ; while if allowed

remain an undue length of time in the garners it heats, begins to decompose, and will yield only bad oil.

The process of making oil is as follows: The fruit is crushed in a stone mill, generally moved by water power; the pulp is then put into bags made of fibre, and a certain number of these bags, piled one upon another, are placed in a press, most frequently worked by hand; when pressure is applied, the oil flows down into a channel by which it is conveyed to a receptacle or tank. When oil ceases to flow, tepid water is poured upon the bags to carry off oil retained by the bags. The pulp is then removed from the bags, ground again in the mill, then replaced in the bags and pressed a second time. The water used in the process of making oil must be quite pure; the mill, press, bags and vessels sweet and clean, as the least taint would ruin the quality of the oil produced. The oil which has collected in the tank or receptacle just mentioned is removed day by day, and the water also drained off, as oil would suffer in quality if left in contact with water; the water also, which necessarily contains some oil mingled with it, is sent to a deposit outside, and at some distance from the crushing house, which is called the "Inferno," where it is allowed to accumulate, and the oil which comes to the surface is skimmed off from time to time. It is fit only for manufacturing purposes. After the second pressing the olive pulp is not yet done with; it is beaten up with water by mechanical agitators moved by water power, and then the whole discharged into open-air tanks adjoining the crushing-house. There the crushed olive kernels sink to the bottom, are gathered up and sold for fuel, fetching about 12 francs per 1,000 kilos., while the *débris* of the pulp is skimmed off the surface of the tank and again pressed in bags, yielding a considerable quantity of inferior oil, called "*Olio lavato*," or washed oil, which, if freshly made, is even used for food by the poorer classes. The pulp then remaining has still a further use. It is sold for treatment in factories by the sulphide of carbon process, and by this method yields from 7 to 9 per cent. of oil; of course suitable only for manufacturing purposes. Only the first two pressings yield oil which ranks as first quality, subject of course to the condition of the fruit being unexceptionable. New oil is allowed to rest awhile in order to get rid of sediment; it is then clarified by passing through clean cotton wool, when it is fit for use.

The highest quality of olive oil for eating purposes should not only be free from the least taint in taste or smell, but possessed of a delicate appetizing flavor. When so many favorable conditions are needed as to growth, maturity and soundness of the fruit, coupled with great attention during the process of oil making, it is not to be wondered at that by no means all or even the greater part of the oil produced in the most favored districts of Tuscany is of the highest quality. On the contrary, the bulk is inferior and defective. These defective oils are largely dealt in, both for home consumption and export, when price and not quality is the object.

In foreign countries there is always a market for inferior defective olive oil for cooking purposes, etc., provided the price be low. Price and not quality is the object, so much so that when olive oil is dear, cotton-seed,



ground-nut and other oils are substituted, which bear the same relation to good olive oil that butterin and similar preparations do to real butter.

The very choicest qualities of pure olive oil are largely shipped from Leghorn to England along with the very lowest qualities, often also adulterated.

The oil put into Florence flasks is of the latter kind. Many years back this was not the case, but now it is a recognized fact that nothing but the lowest quality of oil is put into these flasks; oil utterly unfit for food, and so bad that it is a mystery to what use it is applied in England. Importers in England of oil in these flasks care nothing, however, about quality; cheapness is the only desideratum.

The best quality of Tuscan olive oil is imported in London in casks, bottled there, and bears the name of the importers alone on the label. There is no difficulty in procuring in England the best Tuscan oil, which nothing produced elsewhere can surpass; but consumers who wish to get, and are willing to pay for the best article, must look to the name and reputation of the importers and the general excellence of all the articles they sell, which is the best guarantee they can have of quality.—*Phar. Jour. and Trans.*, May 17, 1884, p. 923.

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## AMERICAN PHARMACEUTICAL ASSOCIATION.

The thirty-second annual meeting of this association will be held at the city of Milwaukee, Wis. The first session will begin at 3 P. M., on Tuesday the 26th day of August, 1884, in Turner Hall. All pharmaceutical organizations entitled to representation in this association are invited to appoint delegates; five from each body, whose credentials should be sent to the Permanent Secretary, Prof. J. M. Maisch, Philadelphia, at least two weeks in advance of the time of meeting. Applications for membership must be accompanied by the fee, and should, if possible, be sent to the Chairman of the Committee on Membership, Mr. G. W. Kennedy, Pottsville, Pa., at least two weeks prior to date of meeting.

As great interest is always shown in the answers made to the queries previously propounded, it is urged upon members who have accepted queries to be answered at this meeting, to have their papers forwarded to the Chairman of the Committee on Papers and Queries, Prof. J. U. Lloyd, Cincinnati, as early as possible that time may be provided both for reading and discussing them. This request applies also to those offering volunteer papers.

Ample room has been provided in Turner Hall, the place of meeting, for the exhibition of articles possessing pharmaceutical interest and not prohibited by the rules of the association. The exhibition room is in charge of the Local Secretary, Mr. Henry C. Schranck, Milwaukee, Wis., to whom all applications for space must be addressed.

As soon as the schedule of reduced railway fares has been completed by the Committee on Railroads, it will be announced in a circular from the Permanent Secretary.



The Committee in charge of all the arrangements for the social entertainment of the members of the association on this occasion, will soon make known to us their programme of pleasure.

W. S. THOMPSON, *President*.

Washington, D. C., June 18, 1884.

## PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

THE IOWA STATE PHARMACEUTICAL ASSOCIATION held its fifth annual meeting in Marshalltown, May 27, President J. H. Harrison in the chair. Mayor Frisbee and Dr. McBride spoke words of welcome. The President delivered his annual address, and the various officers and committees presented their reports; the Treasurer reported a deficit of \$118.34, and about \$600 due from members. The sessions were chiefly devoted to routine business and to discussions on trade interests. Papers were read by J. W. Ballard, on Tincture of Iron; by Mrs. Rosa Martin, on Kousoo; by Dr. Graham, on Secret and Non-secret Medicines; and by E. Wiebenson, on the Strength of Commercial Ammonia Water. J. A. King and T. C. Ballard, of Chicago, and P. J. Singer, of Peoria, were elected honorary members. The officers for the present year are: Dr. W. S. McBride, Marshalltown, President; M. W. Ward, Des Moines, A. H. Miles, Des Moines, and C. R. Wallace, Independence, Vice-Presidents; E. Boerner, Iowa City, Secretary; and C. H. Ward, Des Moines, Treasurer. The next meeting will be held at Council Bluffs, on the second Monday of June, 1885.

After the final adjournment, on the evening of May 28th, the members of the Association attended the dramatic performance of the "Queen's Evidence," at the Opera House, and afterward sat down to a banquet at the Music Hall.

KENTUCKY PHARMACEUTICAL ASSOCIATION.—The seventh annual meeting was held in Louisville, May 21 and 22. The usual routine business, reports of officers and committees, and several papers were brought forward and discussed. Mr. Jefferson Oxley, of Nicholasville, was elected President; J. F. Cook, of Harrodsburg, Secretary; and H. Evans, of Danville, Corresponding Secretary.

MASSACHUSETTS STATE PHARMACEUTICAL ASSOCIATION.—The third annual meeting was held at Lowell, June 4 and 5, and was welcomed by Mr. F. H. Butler. President S. A. D. Sheppard presided; his annual address contained many excellent suggestions. The various officers and committees made their reports, and, besides the routine business, discussions were had on several subjects of trade interests; a number of papers were read and the following officers were elected: C. B. Emerson, Haverhill, President; J. W. Colcord, Lowell, Secretary; and F. H. Butler, Lowell, Treasurer. The next meeting will be held in Pittsfield, on the first Wednesday in June, 1885. After adjournment an excursion was had

up the Merrimac River to Tyng's Island, where several hours were spent in pleasant intercourse.

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THE MISSISSIPPI STATE PHARMACEUTICAL ASSOCIATION held its meeting at Aberdeen, May 20, Dr. J. M. Eckford presiding. Routine business, the reports of officers and committees, and discussions on trade interests occupied the time of the meeting. The officers of the previous year were re-elected, and the Association adjourned to meet next year at Natchez.

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THE MISSOURI STATE PHARMACEUTICAL ASSOCIATION held its sixth annual meeting at Brownsville (Sweet Springs), June 10, 1884. The meeting was called to order at 3 P. M.

The President, Prof. O. A. Wall, M. D., delivered an address replete with wise suggestions and counsel. The Treasurer and Secretary's reports were read; also the reports of the various committees. Fifty-two new members joined the Association.

Officers were elected for the ensuing year: President, Prof. O. A. Wall, M. D., St. Louis; Vice-Presidents, A. F. Fleischman, Sedalia; H. C. Churchill, Windsor, and H. C. Arnold, Kansas City; Treasurer, J. M. Good, St. Louis; Permanent Secretary, G. H. Chas. Klie, St. Louis; Local Secretary, J. J. Thorn, Brownsville.

Papers were read as follows: On Emulsions, by Prof. J. M. Good; Notes on Fluid Extracts, Percolation and Repercolation, by G. H. Chas. Klie; On Ozokerite, by F. W. Sennewald; On Tasteless Iron Preparations, by Dr. H. M. Pettit; Some of the Precautions to be Taken in Preserving Drugs and Preparations, by Prof. O. A. Wall, M. D.

The following resolution was adopted:

*Resolved*, That as an association we discountenance the selling of all patent medicines and proprietary articles at less than retailers list prices, and that we urge all members of this association to become signers of the Campion plan, and to assist in the formation of local associations for the protection of trade interests and the maintenance of prices.

Section two was added to Art. iii. of the constitution. It reads: Any person who has been a member of this Association for two years may become a life member by the payment, in advance, of ten years annual dues and the sum of two dollars for a certificate of membership.

The place was good, the weather was good, attendance good, hotel accommodations good, mine host was good, the humor of members was good, result—a good time all around. The next meeting will be held at same place on the fourth Tuesday in June, 1885.

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THE NEW YORK STATE PHARMACEUTICAL ASSOCIATION held its sixth annual meeting in the lecture room of the New York College of Pharmacy, June 10 to 12. President F. K. Sweet in the chair. The President's address was devoted to the pharmacy law recently passed for the State, to various trade interests and to the internal affairs of the Association. The Treasurer showed a balance on hand amounting to \$1,438.58. The different committees presented their reports and the following officers were elected: President, Wm. H. Rogers, Middletown; Vice-Presidents, Julius Riefflen-

stahl, Buffalo, T. J. Macmahon, New York, and A. Sager, Portland; Secretary, Clay W. Holmes, Elmira; Treasurer, C. H. Butler, Oswego. The following papers were read during the meeting: On Daturine, by J. A. Hartz; A Plea for Botany, by A. B. Husted; On Trade Interests, by C. Z. Otis; The Requisites of a Pharmacist, by T. L. Corwin; Fifty Years Reminiscences of the Drug Trade, by J. S. Higgins. The Association finally adjourned to meet at Saratoga, on the second Tuesday of June, 1885.

Drives through Central Park, a reception at the Park Avenue Hotel, a ball, and after adjournment, a steamboat excursion around the harbor of New York constituted the entertainments.

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THE OHIO STATE PHARMACEUTICAL ASSOCIATION held its sixth annual meeting in Dexter Hall, Cincinnati, May 27 and 28. President West in the chair. After addresses of welcome by Mayor Stephen and Mr. G. Merrill, the President delivered his annual address, dwelling more particularly upon the pharmacy law and the food and drug adulteration law passed last winter, and urging the organization of local pharmaceutical associations. Reports were also read from the different officers and committees, and the following papers were presented: On the Purity of Quinine, and On Hoffman's Anodyne, by Virgil Coblenz; On Salicylic Acid, by J. Winchell Forbes; On Extracts of Malt, by J. L. Irwin, and Jackson's Cough Syrup, by J. U. Lloyd. In addition to the two formulas for *Jackson's cough syrup*, published in this journal in 1852, p. 35, and 1856, p. 205, the last mentioned paper communicates two formulas, of which the following is used in Cincinnati: Extr. ipecac. fluid. f3ss, extr. senegæ fluid. f3iij, extr. rhei fluid. f3iv, morphine sulph. gr. viij, ol. sassafras gtt xxxij, Syr. simpl. q. s. ad Oij.

The officers for the present year are: President, John Weyer, Cincinnati; Vice-Presidents, W. J. Martin, Cincinnati, and M. D. Fulton, Bucyrus; Secretary, L. C. Hopp, Cleveland, and Treasurer, Chas. Huston, Columbus. The next meeting will be held at Sandusky on the third Wednesday of May, 1885.

A reception at the Grand Hotel, a concert, a visit to the Zoological garden and drives to various parts of the surroundings entertained the visitors in the evenings and after adjournment.

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THE PENNSYLVANIA PHARMACEUTICAL ASSOCIATION held its annual meeting at Wilkesbarre, June 3 and 4, and was welcomed by Mayor Bodrick. President J. B. Duble occupied the chair and read his annual address, dealing with the proposed pharmacy law, the patent medicine evil, the cutting of prices, etc. Reports were read from the Secretary, Treasurer and different committees, that of the Treasurer showing a balance on hand of \$259. The officers elected are President, Charles H. Cressler, Chambersburg; Vice Presidents, Charles T. George, Harrisburg, and L. Wolff, M. D., Philadelphia; Treasurer, Joseph L. Lemberger, Lebanon; Secretary, J. A. Miller, M. D., Harrisburg. Two poems were presented by the bards of the association, and twenty-eight papers were read and discussed; these were



on the following subjects : The Use of the Microscope in Pharmacy, by L. A. Ridgway ; Testing of Commercial Glycerin, by G. W. Kennedy ; the Weights of Volumes of Different Preparations at Different Temperatures, by G. Pile ; Boroglyceride, by L. E. Sayre ; Fictitious Liquors, by J. T. Rodman ; the Insecticide Value of Commercial Insect Powder, by W. H. McGarrah ; Extract of Malt, by A. Robbins ; Medicated Waters, by J. W. Landis ; Infusion of Digitalis, W. B. Thompson ; the Preparation of Benzoates, by S. H. Stevens ; Granulated Magnesium Citrate, by W. L. Turner ; Convallaria Majalis, by F. M. Bouton ; Plaster Spreading, by W. B. Thompson ; Use of Caramel, by A. Blair ; Soluble Gun Cotton, by G. Pile ; the Luray Cave, by H. Kingsbury ; Carbonate in Bromide of Potassium, by L. E. Sayre ; the Sale and Use of Nostrums, by C. F. Randolph ; Organization of the Legitimate Pharmacists, by M. N. Kline ; Condition of Pharmacy in Pennsylvania, by G. W. Stoeckel ; Responsibility of Pharmacists for the Quality of Remedies, by J. W. Ridpath ; Lactic Acid of American Manufacture, by J. L. Lemberger ; Proper Education of Apprentices, by S. H. Stevens ; Cultivation of Medicinal Plants, by C. L. Lochman ; Cod Liver Oil, by R. J. Hardy ; Medical and Surgical Knowledge of Druggists, by H. Pursell ; Pharmacists as Physicians, by S. T. Barton ; Oil of Ergot, by C. T. George. It was resolved that the portrait of the late Dr. George Ross be procured for the proceedings. The Association adjourned to meet at Erie on the first Tuesday of June, 1885.

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THE TEXAS PHARMACEUTICAL ASSOCIATION met at Waco, May 13, President E. M. Wells in the chair. The President's address, reports of officers and committees and the proposed pharmacy law claimed the principal attention of the Association. The officers for the current year are : President, E. M. Wells, Fort Worth ; Vice Presidents, F. Kalteyer, San Antonio ; W. J. Morley, Austin, and J. B. Moore, Cameron ; Secretary, J. H. Bradley, Taylor ; Treasurer, E. W. Lancaster, Marshall ; Local Secretary, G. H. Kalteyer. The next meeting will be held in San Antonio in the spring of 1885, the date to be fixed by the executive officers. The pharmaceutical supper at the McClelland Hotel on May 15, must have been a very enjoyable affair. The printed bill of fare before us states that it was perfumed with carbon bisulphide and iodoform ; of the lengthy *menu* we copy only the "pastry" which consisted of cantharidal collodion, Tellurium pie with calcium crust, manganese and cobalt custard and sulphur teroxide with cream ; after such a repast the final dessert properly closed with Hydrogenium protoxide.

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THE VIRGINIA STATE PHARMACEUTICAL ASSOCIATION held its annual meeting in Lynchburg, May 20, President C. A. Santos in the chair. The following officers were elected for the current year : President, W. A. Strother, Lynchburg ; Vice Presidents, R. H. Stratton, Gordonsville ; E. H. Craighill, Lynchburg, W. D. Hudson, Alexandria ; B. H. Gorrell, Lexington ; Secretary, E. R. Beckwith, Petersburg ; Treasurer, F. H. Masi, Norfolk ; Corresponding Secretary, T. R. Baker, Richmond.



## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

*Proceedings of the American Pharmaceutical Association at the Thirty-first Annual Meeting, held at Washington, D. C., September, 1883. Philadelphia: Published by the American Pharmaceutical Association, 1884. Svo. Pp. 577. Price, in paper, \$5; bound, \$5.50.*

After many vexatious delays, the printing and binding of this volume has sufficiently advanced to announce its distribution during the second week of July. In arrangement, etc., it resembles the preceding volumes, the first 306 pages being filled with the report on the progress of pharmacy, and this is illustrated with a number of wood-cuts. The volume is embellished with the portrait of the late Dr. Wm. Neergaard, of New York.

*Grundriss der Pharmakognosie. Von F. A. Flückiger. Berlin: R. Gaertner's Verlagsbuchhandlung, 1884. Pp. 260.*

Outlines of Pharmacognosy.

As the title indicates, this little work is intended to give the outlines of descriptive materia medica only; as such, it is admirably adapted for a text-book for pharmaceutical students, and at the same time the descriptions are sufficiently full to serve as a guide also for others interested in this subject. In his classical work entitled "*Pharmakognosie des Pflanzenreiches*," the author has classified the drugs from morphological, and partly also from chemical characters, in the Outlines, however, the natural system of botany is followed, as being more advantageous and inciting, and less tedious. In this respect opinions are much at variance. Botanical classification is doubtless the only proper one for the study of medical or pharmaceutical botany; but it appears to us that for the systematic study of parts of plants not accompanied by the organs essential for botanical classification, the morphological characters serve a better purpose, at least for comparison with the same parts of other plants having a similar appearance. The work is written in that clear and entertaining style, for which the author is noted, and is a most valuable addition to pharmaceutical literature.

*Twentieth Annual Report of the Alumni Association, with the exercises of the Sixty-third Commencement of the Philadelphia College of Pharmacy for the year 1883-84. Svo. Pp. 156.*

In addition to what may be gleaned from the title page, the pamphlet contains also the addresses and lectures delivered at the five social meetings of the Alumni Association, the twentieth anniversary of whose organization accurs on the 15th of July this year.

*Address on Practical Medicine. By John V. Shoemaker, A.M., M.D. Delivered before the American Medical Association May 7, 1884.*

*How to Grow Fine Celery. A new method by Mrs. H. M. Crider, York, Pa. 1844. Price 25 cents.*

## EDITORIAL DEPARTMENT.

THE MILWAUKEE MEETINGS.—In less than two months the pharmacists and druggists of the United States and Canada will assemble in Milwaukee and hold two separate meetings, the one confining its deliberations to the so-called trade interests, while the other is devoted mainly to the scientific branch of practical pharmacy. The American Pharmaceutical Association will meet August 26th, and its sessions will probably extend over four days, while the National Retail Druggists Association will probably close this year's deliberations on Monday August 25th, or, on the morning of Tuesday. The official notices of these meetings will be found on another page and among the advertisements; in this place we desire to quote from the president's, Henry Canning, call for the meeting on Monday; he says:

Many powerful local organizations have sprung into existence as the possibility of good results from the N. R. D. A. movement began to be foreseen. It is now more than ever necessary to band together locally, in order to carry out what would perhaps never have been accomplished, were it not for this National organization, an infant less than a year ago, already the parent of many promising children.

The Champion movement started out with thirteen signers, a somewhat significant number, and generally laid down as an unlucky one. This glorious Nation started out, however, with just thirteen members, and is now a living illustration of the exceptions to the rule. Much has been said against this attempt to better the mercantile side of our business, from two prominent sources, viz: those chronically and apathetically looking on, and ever holding to the notion that it "cannot be cured, but must be endured;" and those other few, crying out to their brethren that the movement "is undignified and unworthy the Pharmacist," forgetting that we are in a certain sense tradesmen, as well as professional members of society. The former class are only too ready to accept the results of our labors, and are quite as likely to become suddenly very zealous, and to join the "I-told-you-so" ranks. To the latter class, I can only say, that I refer them respectfully to the membership roll of the N. R. D. A.; there they will find the names of very many of the ablest Pharmacists of the land—jealous, too, of the honor of their profession. They fully realize that this rampant tendency to monopoly, which characterizes the age, is making serious inroads in their business, which, from its responsible nature, ought to retire them at a respectable age. This war on Proprietary goods is demoralizing in its effects to the entire mercantile or money-making part of their business. Why should we not attempt, then, to regulate the sale of these arbitrary goods, and if we must handle them (knowing the public will have them), do so only on a fair margin?

Do not, my friends, consider that the mission of the N. R. D. A. ends with the settlement of this one question. Besides the fulfillment of this movement, as yet only fairly begun, there are many things remaining to be done. I will here cite but one reason, among the many, that ought to make every druggist in the land who loves his calling send in his name and dollar, and that is,—that we might by *one gigantic voice* memorialize our law-makers in Congress, to repeal or modify the odious and stigmatizing Retail Liquor Tax, a law which now places us in *title and in fee* on the same level with him who literally deals out his poison to the ruin of mankind. Would not the voice of ten or twenty thousand unwilling, but patient, sufferers be heard? With a gigantic National organization much can be done for the common good; and the common good is the individual good. Co-operation is the only remedy to counteract the monopolistic tendency of the age.

## OBITUARY.

PETER SQUIRE, F.L.S., and an Honorary Member of the American Pharmaceutical Association, died in London, April 6th, 1884, at the ripe age of 86 years. He was born at Stratton, Bedfordshire, in 1798, entered the drug business as an apprentice at the age of fourteen, and was subsequently engaged in several establishments in London, and also in Paris. About the year 1831 he bought the business in Oxford street, with which he remained associated for upwards of half a century. The numerous improvements introduced by him in the preparation of extracts, and in the preservation of the juices of medicinal plants and his success as a practical pharmacist soon gave him prominence. In 1837 he was appointed chemist in ordinary on the establishment of Queen Victoria. He was one of the original members of the Pharmaceutical Society of Great Britain, was elected a member of the first Council and of the first Board of Examiners in 1842, and continued to serve in both capacities until 1870 and 1869 respectively, filling for several years the office of President of the Pharmaceutical Society. Mr. Squire's work, published in 1851, in which the London, Edinburgh, and Dublin Pharmacopœias were compared, forcibly showed the necessity for greater uniformity throughout Great Britain in medicinal preparations. This was finally accomplished under the provisions of the Medical Act of 1858, and the British Pharmacopœia made its appearance in 1864. The "Companion to the British Pharmacopœia," the thirteenth edition of which appeared in 1882, compares the Pharmacopœias of the United States and of six European countries with that of Great Britain. Mr. Squire also collected the formulas used at the principal hospitals of London and classified them for ready comparison in "The Pharmacopœias of the London Hospitals."

In 1881 Mr. Squire was a member of the fifth International Pharmaceutical Congress, and was selected one of the vice presidents; he contributed a paper in which the great diversity in the strength of many important galenic preparations was shown as recognized by the pharmacopœias then in use.

The London "Pharmaceutical Journal" says of him: "Throughout his life, from boyhood to old age, Peter Squire was active, persevering, industrious and self-reliant. Whilst some of his characteristics were too marked to allow him always to escape criticism, yet if his opponents had survived, instead of preceded him, as most of them have done, they would have been among the first to proclaim that in Peter Squire pharmacy has lost a sterling man."

PHILLIP LIONEL MILLEMAN, a graduate of the Philadelphia College of Pharmacy (class 1866), died in Chicago, May 8th, 1884, aged 42 years. The deceased was a native of Alsace, learned the drug business in Chicago, where he established himself a few years after he graduated. He contributed several practical papers to this Journal.

We have also received notice of the death of the following graduates of the same College:

PAUL FREDERICK LEHLBACH (class 1863), died in New York city, April 25th; he was a trustee of the New York College of Pharmacy.

JOHN BEATTY PRICE (class 1874), died in Wilmington, Del., where he had learned the drug business with E. Bringhurst & Co.

WM. WOOD STOCKTON, of Mount Holly, N. J. (class 1876).



# THE AMERICAN JOURNAL OF PHARMACY.

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## MENISPERMUM CANADENSE.

BY HARRY LEE BARBER, PH.G.

*From an Inaugural Essay.*

The rhizome examined upon transverse section showed the thickness of the bark to be one-sixteenth the diameter, in some specimens even less. It is formed of two irregular layers, the inner one (liber) being about twice the thickness of the outer covering, and consisting of roundish or lengthened cells of parenchyma, and the elongated bast fibres. The outer layer is entirely parenchyma. The medullary rays are in the shape of an elongated wedge, curved at the pith, and united at the top by a circular zone of polyhedral parenchyma tissue pale brown in color, and separated from the liber by a darker line. The rays are about equal in width to the wood wedges, and are about fourteen in number, but varied from twelve to twenty-six. The pith is about one-fifth the whole diameter, and consists entirely of polyhedral parenchyma. The wood wedges are semicircular on the outer extremity, being capped by a tissue having a semi-lunar form; they consist of ducts and pleurenchyma, and are invariably truncated and tapering towards the centre. The overground stem consists of about one-half pith. The bark is in two layers, structure similar to the rhizome, but the layers proportionately thinner. The wood wedges are oval, being separated by narrow medullary rays, and the cells of the medulla are large and polyhedral.

*Analysis.*—None of the constituents were soluble in benzin with the exception of a very minute quantity of two yellowish, resinous bodies, one of which was lighter in color, and soluble in ether. No fatty material was dissolved by the action of the benzin.

The ether percolate evaporated left a brownish yellow, soft, resinous mass. This was entirely soluble in alcohol, partially so in water. The residue from this aqueous solution dissolves entirely in chloroform and benzin, and has all the characteristics of a resin. It is tasteless, inodorous, hard and brittle, brownish in color, and corresponds to the soluble resin of the benzin operation. The aqueous solution responded to the general alkaloidal tests. A tannin (menispermotannic acid)



was also found in this, giving, with test solution of ferric chloride, a dark green color.

The ground rhizome was next heated to about 40°C. to expel the ether, and was then percolated with 94 per cent. alcohol. This on evaporation also gave a resinous residue, yellowish brown in color, slightly soluble in ether and partially so in water, a brown resin remaining. Hydrochloric acid was added to this aqueous solution, a yellowish precipitate being thrown down, which was soluble in hot alcohol, and answered all the tests for hydrochlorate of berberine.

On the addition of carbonate of sodium to the mother liquor from the berberine precipitate, a grayish white powder was thrown down, which reacted with various group tests for alkaloids (see "Amer. Jour. Phar.," 1863, p. 302). The precipitate was dissolved in hydrochloric acid, and filtered through animal charcoal. Ammonia was added to the solution, producing a precipitate which on being shaken thoroughly with ether dissolved. This ethereal solution was evaporated, the residue being dissolved in water acidulated with HCl., this solution again being precipitated. The above process was repeated several times, in order to attain the highest degree of purity. The alkaloid was at length procured in the form of a whitish, amorphous powder.

The aqueous percolate of the rhizome gave alkaloidal precipitates, and green ones with ferric chloride, showing presence of the tannin before mentioned.

The percolate with diluted hydrochloric acid gave, with ammonia and general group reagents, alkaloidal reactions corresponding to the previous tests, some coloring matter, and a small quantity of pectin.

The ammoniacal percolate gave no evidence of alkaloidal presence, but a large amount of coloring matter was extracted, the color of this percolate being much darker than any of the preceding ones. Nothing important was found in this operation.

The decoction was concentrated. This gave on addition of absolute alcohol, a flocculent precipitate of gummy matter. Test solution of iodine yielded a bluish coloration indicating starch. Test solution of iodo-hydrargyrate of potassium gave here slight evidences of alkaloidal reaction.

On distilling the rhizome with water, a milky-white liquid resulted, separating after long standing, a very minute portion of volatile oil which was colorless, and aromatic, the odor resembling that of oil of erigeron.

Carefully heating the powdered rhizome, without charring, at or near 100°C., the moisture was found to be 3.2 per cent. On incineration it yielded 7.07 per cent. of ash containing K., Ca., Mg. and Si., with traces of Fe.

The second alkaloid<sup>1</sup> obtained from the rhizome was in the form of a whitish amorphous powder, gradually becoming darker on exposure to the air and light; when first precipitated it was supposed to be either oxyacanthine or menispermine. Solutions of the alkaloid were made containing one part in one hundred, in two hundred and fifty, in five hundred, in seven hundred and fifty, and in one thousand parts. These five degrees of strength were taken that the exact limit of precipitation and sensitiveness could be ascertained. The behavior of oxyacanthine is that described by Mr. H. B. Parsons.

	Oxyacanthine.	Menispermine.	Menispine.
Color.....	White, yell. on expos.	White, yell. on expos.	White, yell. on expos.
Taste.....	Bitter.	Tasteless, entirely.	Very bitter.
Water.....	Nearly insoluble.	Insoluble.	1 part in 75.
Alcohol, abs.....	Soluble.	1 part in 200.	Very soluble.
Alcohol, com.....	1 part in 30.	1 part in 200.	1 part in 6.
Ether.....	1 part in 125.	1 part in 60.	1 part in 40.
Chloroform.....	Freely soluble.	1 part in 170.	1 part in 20.
Benzol.....	Soluble.	1 part in 200.	Insoluble.
Ammonia.....	Sparingly soluble.	Insoluble.	Insoluble.
Sol. Soda.....	Moderately soluble.	Insoluble.	Insoluble.
Sol. Soda Carb.....	Nearly insoluble.	Insoluble.	Insoluble.

It will be noticed that the alkaloid resembles oxyacanthine in color and influence of air. The bitter taste was distinctly noticeable in a solution of one part in fifteen hundred; it is to be remarked in this connection, that it was not nauseous, but agreeable, like that of gentian.

A marked difference in the solubilities is seen, the alkaloid being five times more soluble in alcohol than oxyacanthine, and over three times in ether. While oxyacanthine is more or less soluble in ammonia, solution of soda, and solution carbonate of sodium, the alkaloid in question is entirely insoluble in all three.

It was also noticed that menispermine was entirely insoluble in and unchanged by hydrochloric acid, but menispine is freely soluble with-

<sup>1</sup> We propose for this alkaloid the name of *menispine*.—ED.

out residue. Other marked differences are that menispermine is perfectly devoid of taste, the other persistently bitter, even in very dilute solutions. Menispermine is insoluble in water, and barely soluble in excess of alcohol and chloroform.

The following experiments prove, in the opinion of the writer, the alkaloid to be distinct from either oxyacanthine or menispermine. The solutions used in this case were in alcohol, 94 per cent., the strengths being one part in two hundred. The reactions of the white alkaloid of *Menispermum canadense* are identical in both water and alcohol; the table given by the author describing the precipitates obtained from the weaker solutions as being of a paler color, but as being distinctly observable in a  $\frac{1}{1000}$  solution, the reactions with potassium-mercuric iodide, phospho-molybdic acid and tannin being faintest. Menispermine was examined at the suggestion of Prof. Maisch, to whom the writer is indebted for the sample used in the experimentation.

	Menispermine.	Oxyacanthine.	Menispermine.
Tr. Iodine.....	Yellow ppt.	Dark brown red ppt.	Dark red ppt.
Iodine in KI.....	" "	" " "	" "
Potass. Merc. Iod.....	White "	Yellowish ppt.	Yellowish white ppt.
Ac. phospho-molyb..	" "	Brown ppt. insol. in but dark blue by $\text{NH}_4\text{OH}$	Yellow ppt. sol. in $\text{NH}_4\text{OH}$ with't change
Potass. cadm. Iod.....	" "	White ppt.	Grayish ppt.
Acid, pleric.....	Yellow "	Insol. in $\text{HCl}$ . Yellowish ppt.	Sol. in $\text{HCl}$ . Yellow ppt.
Platinic chloride.....	" "	Insol. in $\text{HCl}$ . Yellowish ppt.	Insol. in $\text{HCl}$ . Yellow ppt.
Gold chloride.....	" "	Insol. in $\text{HCl}$ . Orange ppt.	Insol. in $\text{HCl}$ . Orange ppt.
Acid, tannic.....	" "	Brownish ppt., insol. in $\text{HCl}$ and dil. $\text{HCl}$ .	Whitish ppt., insol. in $\text{HCl}$ and dil. $\text{HCl}$ .
Acid, sulph. conc.....	Yellow coloration.	Brownish purple, darker on standing.	Brown, fades on standing.
Acid, sulpho-molybdic.....	Yellowish "	Purple, fades slowly, becomes yellow, then green.	Brown, fades to yellow
Acid, nitric, conc.....	No change.	Orange red, effervesces color permanent.	Effervesces, yellow, permanent.
Zinc chloride, fused..	"	Chocolate brown.	Brownish yellow.

The four last mentioned reagents were applied to the powdered alkaloids.

# MENTHOL.

By PROF. HENRY TRIMBLE.

Under the name of "Peppermint Camphor," and "Solid Oil of Peppermint," menthol appears to have been known as early as 1829. Its composition and some of its properties were investigated by Dumas, Blanchet and Sell, and Walter, with the result that they closely agreed on its composition, but differed widely concerning the fusing point. These investigations were on the camphor from American peppermint, and they all agreed on the formula  $C_{10}H_{20}O$ , while the fusing point varied from  $25^{\circ}C.$  to  $36.5^{\circ}C.$ , boiling-point from  $208^{\circ}C.$  to  $213^{\circ}C.$

In 1862 Oppenheim ("Jour. Chem. Soc.," xv, 24) described a "Solid Oil of Peppermint" from Japan, the product of *Mentha arvensis*, and for which he proposed the name of menthol. He stated the fusing point to be  $36^{\circ}C.$ , boiling point  $210^{\circ}C.$ ; and the following result in regard to composition:

Japanese.	American (Dumas).	Calculated for $C_{10}H_{20}O$ .
C.....76.93	76.5	76.92
H.....13.40	13.1	12.82
O.....		10.26

Not much attention appears to have been given to this substance, until mention is made ("Am. Jour. Phar.," May, 1871) of the use of Chinese or Japanese oil of peppermint by the Chinese of California for neuralgia. Flückiger ("Pharm. Jour.," Oct., 1871), examined some of this oil and obtained menthol from it, the identity of which with the menthol from *M. piperita* he considered "not quite satisfactorily proved."

In 1874, Mr. John Moss ("Pharm. Jour.," Nov., 1874), speaks of the arrival in London of both the solid and liquid oil from Japan. He found the fusing point of the solid oil to be  $39^{\circ}C.$ , and boiling point  $215^{\circ}C.$ , although it began to boil at  $210^{\circ}C.$  In 1876 Messrs. Beckett and Wright ("Jour. Chem. Soc.," xxix) examined this same menthol furnished by Mr. Moss. They first purified it by solution in weak alcohol, separation as an oil and exposure to air until crystals formed. These crystals, after several weeks' exposure to air, fused at  $42^{\circ}C.$ , and boiled at  $212^{\circ}C.$  A combustion gave the following result:

	Calculated.	Found.
C.....	76.92	76.35
H .....	12.82	12.91

Since then menthol from Chinese or Japanese oil has rapidly gained



in popular favor, until now it may be found in a variety of forms in almost every drug store.

In the June number of this Journal is mentioned a menthol from *M. piperita*, for which the name "Pipmenthol" is very properly suggested, to indicate its origin, and distinguish it from that of China. There is sufficient physical difference between the two to warrant the employment of different names. The sample furnished me by Prof. Maisch has the characteristic odor of *M. piperita*, while the commercial menthol has a peculiar odor resembling a mixture of peppermint with other members of the mint family. The crystals are "snow-white and acicular," while those of commercial menthol are more or less transparent. Chemically the two are undoubtedly identical, as the following experiments will show.

Pipmenthol fused at  $42^{\circ}\text{C}.$ ; several determinations confirmed this. The thermometer used was compared with a number of others and found to be accurate. Japanese menthol fused at  $41^{\circ}$ . Three combustions, one of pipmenthol and two of the Japanese were made with the following result:

Calculated for $\text{C}_{10}\text{H}_{20}\text{O}$ ,	Pipmenthol.	Japanese.	
		I.	II.
C.....76.92	77.14	79.63	79.33
H.....12.82	12.93	13.03	12.75
O.....10.26			
<hr/> 100.00			

The difference in the amount of carbon in the Japanese is explained, as is the lower fusing point, by the presence of some of the liquid oil richer in carbon. This will also explain the low fusing point given by the early investigators.

As found by Beckett and Wright, menthol, after exposure to air for some weeks will have a higher fusing point, and we may suppose a lower carbon percentage. The pipmenthol as now made may properly be taken as a standard for the determination of the properties of this substance, and there is little doubt but that the Japanese article may be so purified as to resemble it in everything but odor.

*Philadelphia*, July 15, 1884.

## FERRIC CHLORIDES.

BY R. ROTHER.

The Pharmacopœia was never very successful in the selection and construction of its iron compounds. The tendency towards an unattainable degree of definiteness and purity was perhaps the main cause of this failure. In pharmacy excessive purity and accuracy is in most cases wholly unwarranted. Extreme concentration is another characteristic whose undesirable features are conspicuously manifested in at least two prominent directions. The one leads on to certain forms of dense solutions whose high degree of strength is inimical to permanence. The other, however, which comprises the most vicious system of the two, embodies a class of preparations whose exalted medicinal power, irrespective of physical concentration, is their principal danger. Without citing the very numerous instances so readily at hand, let the case of tincture of opium suffice. This preparation, already four times too strong for general safety, has recently had its strength augmented by 50 per cent. All of these powerful, especially liquid, compounds call for a systematic and universal dilution.

In order to reach a highly definite result and simultaneously secure a superior grade of purity, the Pharmacopœia, in its process for solution of ferric chloride, uses an excess of iron. This surplus of iron is intended to exclude contaminating metals and insure the perfect saturation of a certain quantity of acid. Since, however, a practically pure quality of iron is easily obtainable, and since the acid itself is never definite, these troublesome precautions are wholly gratuitous. To facilitate the solution of the metal under these adverse conditions the Pharmacopœia has, however, improved the process by adding water to the acid. As 100 parts of the solution shall contain 37·8 parts of ferric chloride, it must represent 13 parts of metallic iron, thus:

$$\text{FeCl}_3, 162\cdot1 : \text{Fe}, 55\cdot9 :: 37\cdot8 : 13\cdot03.$$

This amount of iron in the condition of normal ferric chloride represents 80 parts of chlorhydric acid, thus:

$$\text{FeCl}_3, 162\cdot1 : 3(\text{HCl}), 3 \times 36\cdot4 \div 319 :: 37\cdot8 : 79\cdot82.$$

Officially 86 parts of the acid are directed.

Now, since under ordinary circumstances 80 parts are sufficient, it follows that the 6 superfluous parts must be counted as impurity. Yet

the inference is fair that this excess is needed to prevent decomposition during the application of heat. But a portion of it is intentionally added for the presumptive generation of an ether when the liquor is compounded into tincture. As, however, this ether is considered an essential component of the tincture in whose production three months of time are given, it follows, that be the creative agent what it may, it cannot be officially viewed as an undesirable contamination. Now, the Pharmacopœia has been very solicitous to employ only nitric acid in the development of ferric salts in general and to expel any excess by means of heat. It can be easily shown that it is impossible to get rid of the nitric acid in this manner. The expulsion of the lower oxides of nitrogen is not even attainable by this method. It can be further shown that the production of the ether depends upon the presence of these oxides of nitrogen exclusively and that the chlorhydric acid has no share in the performance. To remove all doubt in this connection, the writer made three mixtures, preserved in well-stopped bottles, the first being composed of one part of chlorhydric acid and nine parts of alcohol; the second of one part of chlorhydric acid and four parts each of water and alcohol, and the third of one part of nitric acid and four parts each of water and alcohol. After months of standing the first two mixtures possessed no odor but that of alcohol. After several days' standing the third mixture had developed the unmistakable odor of ethyl nitrite and at the same time began to effervesce slightly, especially on shaking. The effervescence finally ceased, but the fragrance in the meantime had become much stronger. When solution of ferric chloride containing some nitric acid is mixed with alcohol, or either alcohol and water, a very dark, sometimes nearly black color is soon produced, and shortly after nitrogen tetroxide is copiously evolved. Eventually the fuming ceases and the color assumes a much lighter shade. However, the tint permanently remains many shades deeper than that of a similar combination free from nitric admixture. The colored product, after the main reaction is over, is always characterized by the odor of ethyl nitrite. If the very dark solution at the incipency of the reaction is subjected to heat, a violent effusion of nitrogen tetroxide results, and the deep hue is simultaneously discharged, leaving only the normal color of ferric chloride. Incidentally during this operation the odor of nitrous ether also disappears and is not regenerated during any subsequent period of storage. It is well known that when Monsel's solution is evaporated a pasty, deliquescent residue

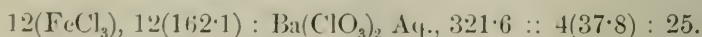
remains. In order to dry this perfectly a moderately high and prolonged heat is necessary. It then becomes pulverulent and unhygroscopic. Even in this condition, it long after slowly dissipates nitrous vapors. On mixing a little alcohol with the pasty residue and placing it in a warm locality it dries up to a light friable mass utterly free from nitrous compounds and deliquescent tendency. These results show that the usual methods do not prevail against the presence of nitric acid and the lower oxides of nitrogen. They, however, adduce powerful evidence that alcohol is the effective purifying agent, and that after its influence has been exerted upon the usual forms of ferric salts, developed by nitric acid, they cease to generate nitrous ether in the presence of alcohol. Under ordinary conditions nitric acid does not directly react upon alcohol and form ethyl nitrate, it is first reduced, in decomposing a part of the alcohol, to nitrous acid which then combines with the remaining alcohol and produces ethyl nitrite. When nitrous oxide, that is, nitrogen trioxide, comes in contact with alcohol, it also gives rise to ethyl nitrite. Nitrogen tetroxide in reacting upon bases effects the formation of a mixture of nitrates and nitrites and hence when alcohol slowly absorbs this gas, nitric acid and ethyl nitrite result. Nitrogen dioxide does not exert a direct effect itself, but its oxidation producing the tetroxide consequently leads to an identical product. From this it is seen that the chief factors in the development of an ether in tincture of ferric chloride are three lower oxides of nitrogen, namely, the di, tri, and tetroxide, whilst nitric acid acts but indirectly, and chlorhydric acid is wholly inert. In the "American Journal of Pharmacy" of April, 1876, p. 177, the writer has already dwelt upon similar considerations. If the Pharmacopœia insists on the method of transformation by means of nitric acid with a view to the exceptional purity of the product, it is certainly not attaining its object. To secure this end it must either purify the crude product by means of alcohol or abandon the nitric acid process. If, then, after producing, by whatever means, a compound of the desired quality, the ether-forming feature will naturally disappear. However, if this adjunct is deemed essential, it can readily be supplied by the addition of about 4 per cent. of spirit of nitrous ether. This procedure would also impart a more definite and practical character to the preparation. In regard to the official proportion of alcohol in the tincture, it may be said that it is unnecessarily great. Whilst a moderate amount, say



35 per cent., may be beneficial, any large excess may be fairly judged as a species of impurity, aside from being a positive waste.

In the "*Pharmacist*" for July, 1869, the writer advocated the use of potassium chlorate for the development of ferric salts. With this process a slight impurity is incurred in the form of potassium chloride. From a therapeutical aspect, as well as viewed from the side of pharmacy, this contamination is absolutely unobjectionable. Recently, however, the writer has used barium chlorate in this operation with great success. By its employment a more than practically pure product is obtained. In this new process chloric acid in moderately concentrated solution is first prepared either by dissolving the chlorate in about five times its weight of warm water and then gradually adding sulphuric acid in slight excess, but previously diluted by pouring it into about five times its weight of water. Or the sulphuric acid may first be mixed with water equal to five times the weight of the chlorate before the addition of the latter. In such cases the precipitated barium sulphate is separated by filtration through paper. It stands to reason that contact of strong sulphuric acid with the chlorate must be cautiously avoided if dangerous explosions are not to occur. Should this process become popular the chloric acid in proper form and quantity would soon be furnished by the manufacturers at appropriate prices. The writer, however, prefers to add the chlorate directly to the acidified solution of the ferrous salt and then precipitate the barium as sulphate with a slight excess of sulphuric acid, diluted or not. If any barium sulphate remains dissolved at all it is an indiscernable trace.

The term peroxidation as applied to the transformation of valence from a lower to a higher degree and perfectly appropriate in the older chemistry has now become very awkward and meaningless. A new term is highly desirable, and hence the writer proposes "valeation" as indicative of the transformation of valence. In place of the antiquated terms, deoxidation and peroxidation, the new forms, devaleation and pervaleation are properly substituted. Consequently changing the valence to a diad will be called divaleation, to a triad, trivaleation, etc. Now to effect the trivaleation of the iron in 400 parts of the official solution of ferric chloride requires 25 parts of barium chlorate, as is seen from the following proportion:



The amount of sulphuric acid necessary to precipitate the barium as

sulphate is 8 parts, this being a slight excess as will be noticed from the accompanying proportion:



Since the chlorhydric acid resulting from the decomposition of the generated barium chloride amounts to one-eighteenth of the whole, or  $320 \div 18 = 17.78$  parts, the total quantity will be 337.78 parts. Although this represents a considerable excess, the amount is still below the official quantity, which is 344 parts.

In the "Pharmacist" for July, 1872, the writer recommends a process for making tincture of iron, in which he proposed to use only the requisite amount of a practically pure metal. By avoiding an excess, a known definite amount of iron was thus incorporated. The writer also advocated the employment of all the acid at once, thereby greatly expediting the solution of the iron. On this occasion the acid was used in a diluted form. Recently, however, it was found unnecessary to dilute the acid when using the whole of it at the outset. The continual presence of a large excess acting upon a fine form of iron insures rapid solution, with uniform energy.

From these various considerations the following formula for a solution if ferric chloride is devised:

Iron, in fine wire.....	53 parts.
Chlorhydric acid.....	320 "
Barium chlorate.....	25 "
Sulphuric acid.....	8 "
Water sufficient to make.....	400 "

Add the iron gradually to the chlorhydric acid, and when all has dissolved add the barium chlorate, in small portions at a time, during constant stirring of the mixture. When the incorporation, solution and decomposition of this is complete, pour in the sulphuric acid, previously diluted with half its weight of water, with constant stirring, and set the mixture away, so that the barium sulphate may subside. Now decant the clear solution, and transfer the turbid portion to a filter, and add water through the filter until the decantate and filtrate together weigh 400 parts, and mix them.

The so-called basic salts of iron are of two kinds, which in many respects are so similar that very little, if any, distinction has been made between them. In many particulars, however, the difference is so important that for various practical reasons it cannot be ignored.

These classes are in the one case oxygen substitutions of the normal salts, and in the other case hydroxyl substitutions. In connection with certain non-volatile polybasic carbon acids the stability of the two kinds is equally good. But in the case of various mono-basic volatile acids, mineral or carbon, the oxygen substitutions are remarkably unstable, particularly in very concentrated or extremely dilute solutions. On the other hand, the hydroxyl salts are much more permanent, but in strong solutions are liable to change into the other class from the chemical separation of water.

Normal ferric hydrate or ferric hydroxide may be viewed as a complete hydroxyl substitution of a normal ferric salt. This compound, even in the humid state, soon loses half of its water, and is thus changed to an oxy-hydrate or hydro-oxide. On drying, the loss of water amounts to two-thirds of the whole, and the body is reduced to the form  $\text{FeO}(\text{OH})$ . The normal ferric hydrate dissolves with tolerable readiness in most acids, yielding soluble ferric salts. As the separation of water proceeds the insolubility augments, and hence the dried hydrate unites with a very limited number of acids. Owing to the comparative slowness with which the ferric hydrate obtained by precipitation with ammonia dissolves in acids, it seems likely to be even then a partial anhydrate.

In the "*Pharmacist*" for December, 1873, the writer called attention to the fact that a ferric hydrocarbonate,  $\text{Fe}_2\text{CO}_3(\text{OH})_4$ , is obtained by pouring solution of ferric sulphate into excess of disodic carbonate. It was found that this compound, aside from various other advantages, dissolves much more rapidly and copiously in acids than the customary hydrate. More recently the writer ascertained that sodium bicarbonate is superior in a variety of aspects, and also relatively cheaper. Theoretically, 100 parts of solution of ferric sulphate require 36.22 parts of the sodium salt for precipitation, but in practice it is advisable to employ about 42 parts of it.

The so-called dialyzed iron was once wrongly supposed to be a colloidal form of ferric oxide or hydrate. It is now known to be a ferric hydrochloride, possessing a low equivalence of chlorine. It is ordinarily prepared by macerating for a considerable time a large excess of ferric hydrate in weak chlorhydric acid. In "*New Remedies*" for January, 1881, the writer recommended the use of ferric hydrocarbonate for this purpose, owing to its greater purity and speed of solution. The formula which was then submitted for making a solution of triferrous hydrochloride,  $\text{Fe}_3\text{Cl}(\text{OH})_3$ , yielded a very concentrated

preparation, which for this reason owned a disposition to generate a peculiar opacity or fluorescence and gradually deposit a sediment. On reducing it to about one-third this strength the decomposition is prevented or arrested.

The Pharmacopœia has now adopted a solution of normal ferric acetate, which will probably be more stable than the concentrated and basic compounds elsewhere in use. In view of the fact that the volatile acetic acid does not supply a desideratum in the range of these compounds, the writer experimented with lactic acid. It was then found that no soluble hydro-salt could be formed by it, at least with the use of ferric hydrocarbonate.

On the addition of a very small proportion of chlorhydric acid solution resulted at once in the production of a deep brown basic compound. By varying the relative amounts of the chlorhydric and lactic acids within certain limits a large number of these compounds can be formed. The writer, however, prefers to unite them in such proportion that the chlorhydric acid shall constitute one-third of the acid content, and that these combined shall be one-third of the normal equivalence. In this manner a hydro-salt is obtained whose amount when dried in scales is in close accord with the molecular formula synthetically constructed and represented by the expression  $\text{Fe}_3\text{ClLc}_2(\text{OH})_6$ , with a molecular weight of 483.4.

This ought to be a valuable substance, for therapeutical reasons, and might in this connection replace quite a number of less adaptable compounds. It is in so far superior to dialyzed iron that it can be prepared in a solid, soluble form, and exhibited in any strength of solution. The metallic flavor is almost if not wholly absent. It has an agreeable, sweetish, slightly astringent and mildly acidulous taste. The salt can readily be obtained in scales which are slightly deliquescent in a humid atmosphere, but otherwise permanent and promptly and completely soluble. The solution is remarkable for the fact that moderate temperatures do not disturb it, but boiling it a short time causes a profuse non-gelatinous precipitate, which promptly redissolves on cooling. The process for preparing it in a definite solution as well as in scales is as follows:

Solution of ferric sulphate.....	2,085 parts.
Sodium bicarbonate.....	850 "
Lactic acid.....	240 "
Diluted chlorhydric acid.....	364 "
Water sufficient to make.....	2,085 "



Mix the solution of ferric sulphate with 4,000 parts of water and gradually add it to the sodium bicarbonate (contained in a capacious capsule) with constant stirring. Now apply heat until effervescence has nearly ceased; dilute the mixture with 40,000 parts of water, and let the precipitate subside. Decant the supernatant liquid and treat the remainder twice more with the same amount of water and decant as before. Now pour the washed precipitate upon a filter, and when the excess of adhering water has drained off transfer it to a capsule and mix it with the lactic acid; then add the diluted chlorhydric acid, warm gently, and when the precipitate has dissolved add sufficient water to make the solution weigh 2,085 parts. To obtain the salt in scales evaporate the solution gently to a syrupy consistence and spread it out on plates of glass to dry.

## THERMO-CHEMISTRY OF HALOÏD SALTS.

BY BERTHELOT.

In a series of eight papers the author, by adducing the data for the application of his general theory to the case of the double haloid salts, adds a new chapter to the researches on chemical mechanics which he has pursued for so many years. A complete theory of saline reactions requires that *all* the compounds capable of being formed under the given conditions of the experiment shall be taken into account. Thus, the heats of formation and of dissociation, not only of the simple salts, but those also of all the acid, the basic, the double, the hydrated, and the anhydrous salts that can possibly be formed under the circumstances, must be determined beforehand. This has been done in many cases in the present series of papers, and the observed reactions explained by the principle of maximum work, as in the theory of chemical equilibrium already advanced in the author's *Essai de Mécanique chimique*. The first paper merely states the range of the investigation. The second gives the thermal data for double salts formed of mercury, of potassium, or of both, united with one or two of the three halogens, chlorine, bromine, iodine, or with their analogue, cyanogen. Some interesting particulars are noted concerning the successive physical and chemical changes of such salts. Thus, the heat of combination from the simple salts is very small, except when the iodide is one component, when the heat, reckoned from the yellow iodide, is about the same as that disengaged in the transforma-

tion of yellow to red iodide. The combination of potassium iodide with mercuric cyanide liberates much heat, and the author regards the resulting product as a triple salt formed by a union of mercuric iodide with a double cyanide of mercury and potassium.

In the third paper, it is shown that haloïd salts of mercury, like those of other metals, combine with their corresponding hydracids, forming well-defined, crystallised acid salts. Red crystallised mercuric iodide dissolves readily in dilute hydriodic acid with disengagement of heat, and there is evidence of the stability of the compound thus formed, which may be regarded as mercurio-hydriodic acid, corresponding with a whole series of double salts, and analogous to the well-known complex acids derived from metallic cyanides. The heat of formation of acid chloride of mercury is less than that of the acid bromide, and much less than that of the acid iodide, whilst mercuric cyanide disengages scarcely any appreciable heat with hydrocyanic acid. The next paper treats of the heat of neutralization of hydracids by the oxides of mercury and of potassium.

In the fifth paper are discussed the isomeric states of the haloïd salts. The heat of transformation of 227 grams yellow mercuric iodide into red is 1.5 cal. In the formation of silver iodide by precipitation with potassium iodide, a succession of transformations occur in the amorphous state of the substance, and its passage from the last amorphous condition to the crystalline is not accompanied by any sensible thermic phenomenon, that is to say, the sum of the work done in the transformation is sensibly *nil*. The same thing happens when an organic substance passes into an isomeride of the same chemical functions. But when there is a change of condensation (polymerization), or a change of chemical function with the same condensation, a notable disengagement of heat is usually observed.

The sixth paper is devoted to a study of the double decompositions of the haloïd salts of mercury, and the numerical results confirm in all respects the author's principles. In all cases, the system which disengages the most heat is formed by preference whether as regards dissolved or insoluble substances, and Berthollet's laws are sometimes verified and sometimes quite contradicted, just as they are or are not in accordance with the thermochemical previsions.

The seventh and eighth papers deal with the haloïd salts of silver, in the reactions of which there are certain special distinctive circumstances, such as the inverse displacements to which attention has lately

been called. The author explains these by the formation of a double salt and the consequent separation of the alkaline salt along with the haloïd salt in the solid form. The displacement of hydrochloric acid united to silver, by hydrobromic and hydriodic acids, whether free or combined with alkalis, takes place by reason of the thermic preponderance of these last acids, and would exclusively take place but for the existence of double and acid salts capable of giving rise to inverse reactions, which however are limited by the dissociation of the double salts. And with the silver salts, as with the mercuric, the whole resolves itself into one fundamental action, namely, that which corresponds with the thermic maximum.—*Jour. Chem. Soc.*, 1884, p. 656; *Ann. Chim. Phys.*, [5], 29, p. 198-288.

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## THE "DROP" METHOD OF CHEMICAL ANALYSIS.

By DR. H. HAGER.

The customary methods for testing medicinal agents, which are both tedious and require a larger quantity of material, can be superseded by a method which requires merely single drops of the reagent, as well as of the liquid to be examined. For this method the following reagents are needed:—

Red and blue litmus paper and turmeric paper.

Extract of indigo paper, which is turned yellow by hot nitric acid and caustic alkalies, but not by ammonia.

Rosaniline paper as a test for alcohol.

Potassium ferrocyanide paper as a reagent for ferric salts (blue), copper and uranium (deep brown), gold (greenish brown), platinum (brownish green to reddish), thallium and vanadic acid (yellow).

Potassium sulphocyanide paper is turned decidedly yellow by bismuth nitrate, bluish black by salts of copper, red by solution of gold, white by mercuric nitrate, black by mercurous nitrate, and blood-red by ferric salts.

Potassium iodide paper is turned red by mercuric salts, green by mercurous salts, yellow by solution of lead. For detecting chlorates 2 to 3 cc. of the liquid are placed in a small test-tube along with a slip of the paper; 1 cc. of dilute sulphuric acid is then added, and heat is applied. If chlorate is present the liquid turns yellow.

Mercurous nitrate paper serves when moistened to detect ammonical

gas, which turns it black; caustic alkalies and alkaline mono-carbonates stain it greenish-brown to black, whilst the alkaline bicarbonates leave it colorless.

Silver bichromate paper turns yellow with free hydrochloric acid.

Besides these the author mentions a number of other papers less frequently needed. The use of all consists in letting a drop of the liquid in question fall upon a slip of the paper.

The author tests for arsenic (arsenious and arsenic acids) by means of slips of sheet brass, 2.5 to 3 centimetres in length and 15 to 17 centimetres in length. The hydrochloric solution is mixed with a little oxalic acid, or the ammonical solution is supersaturated with hydrochloric acid and mixed with oxalic acid in order to reduce arsenic to arsenious acid. A drop of the solution is put upon a brass plate and sharply dried; the place of the drop is then washed with water, when a dark spot of a permanganate color reveals the presence of arsenic. Dark thin outlines still appear in case of dilution with 150,000 parts.

In cases where the papers and the brass plate are not used the author places the two drops (of the reagent and the liquid in question) near each other upon a slip of glass and mixes them. The transparency of the glass renders the slightest turbidity visible.—*Pharmaceut. Central-Halle and Chemiker Zeitung*; *Chem. News*, July 4, 1884, p. 6.

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## THE VALUATION OF TARTAR EMETIC.<sup>1</sup>

BY W. B. HART.

The adulteration and consequent lessening of the valuable ingredient in drugs and dye-wares tends to develop methods of analysis, by which the commercial value of them may be rapidly determined, and thus the user and honest manufacturer be protected. Tartar emetic, whose value to the dyer depends solely on the amount of antimony it contains, has of late been lowered in quality, until in some cases it contains only about one-half the amount of metal that a good commercial sample should have. The usual method of estimating the antimony in this salt is by means of a standard solution of iodine, as recommended in most volumetrical analysis manuals. This method gives good results in careful and patient hands, but I find that it can be well replaced by a solution of calcic hypochlorite, or common bleach liquor, of a strength

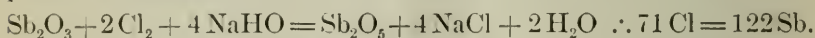
<sup>1</sup> From the "Journal of the Society of Chemical Industry," May 29, 1884.



of about 2° Twaddell. The value of the hypochlorite can be found by using a standard solution of sodium arsenite. The sodium arsenite is the usual decinormal solution, made by dissolving 4.95 grams of pure arsenious acid in a solution of sodium carbonate, and when cool diluting to 1 litre. About 25 grams of sodium carbonate are required.

1 cc.=.00355 grams of Cl, or .0061 grams Sb.

The usual potassic iodide and starch paper are needed. The process is conducted as follows: A weighed portion of the tartar emetic is dissolved, assisted by heat, cooled, and made alkaline with sodium carbonate. A known amount of the calcium hypochlorite solution is added in excess, this being shown by the blue color which a drop of the liquid gives to the starch paper. The excess of calcium hypochlorite is now found by titrating with the standard sodium arsenite, until the liquid ceases to give the blue color to the starch paper. The value of the hypochlorite added is found by taking an amount equal to that put to the tartar emetic, or an aliquot portion may be taken, making alkaline as before and titrating with standard arsenite, Penot's method. If an aliquot part is taken, the value of the whole is then to be calculated. The worth of the total hypochlorite added being known, and that of the excess also known, the amount of hypochlorite and therefore chlorine used to oxidize the antimony is thus obtained by difference. This also gives the amount of antimony. The reaction that takes place is as follows:—



This process is rapid, and, for all practical purposes, accurate, the end of the reaction being sharp, and denoted at once, which with the iodine process is both tardy and tiresome.

The calcic hypochlorite solution, the value of which should be found at least once a day when required, must be kept in a stoppered bottle in a dark place, as it decomposes quickly if exposed to light and air. Even then it will not be of use long, but a fresh solution can easily be made.

The following are the results obtained by this process, along with those obtained by the iodine method, showing comparison:

	Iodine Process.	Chlorine Process.
No. 1. Mean of 3 trials.....	33.41 per cent, Sb.	33.29 per cent. Sb.
	37.048   "   "	36.944   "   "
No. 2.....	36.896   "   "	36.820   "   "
	37.000   "   "	37.020   "   "
	Mean 36.981 per cent. Sb.	36.928 per cent. Sb.

This method might be reduced to a comparative test only.

Let a standard sample of tartar emetic be procured in which the amount of antimony is known. Equal weights of the standard sample and of the sample to be tried are dissolved separately. From a Bink's or glass tap burette is added to the standard sample a solution of bleach liquor until the liquid just blues the aforesaid starch papers. The amount of bleach liquor used is noted. The second sample is treated in the same way. The relation of the antimony in the samples will be in the direct ratio of the volume of bleach liquor taken, and, therefore, in dyeing the amounts to be taken to produce a certain shade will be in the inverse ratio.

*Example.*—Equal weights of the standard sample (1), and of the second (2), were dissolved. No. 1 took 30 volumes of bleach liquor, and No. 2 took 20 volumes; then the ratio of the amount of antimony is as 3 to 2. Therefore, in practical work, for every two parts of the standard sample, three parts of the sample in question must be used and those give the same result.—*Pharm. Jour. and Trans.*, June 28, 1884, p. 1053.

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## NOTE ON KAMALA.

BY WILLIAM KIRKBY, PH.C.

*Read before the Manchester Pharmaceutical Association.*

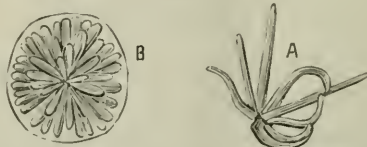
Kamala was not known in Europe as a drug until a very recent period. Before the year 1852 the only account of it is in the writings of Anslie, Roxburgh, Royle and Buchanan. In that year, however, Port-Surgeon Vaughan met with it in the bazaar of Aden under the Arabic name of *wars*. Specimens obtained by him were forwarded to Mr. Daniel Hanbury, together with information concerning the same. The following information collected by him is found in his "Notes on Drugs observed at Aden, Arabia:" "Wurru<sup>s</sup> or waru<sup>s</sup> is a red powder used chiefly as a dye. It is the produce of a plant resembling sesame. The plant rises to about 5 feet in height, bearing several separate bunches or clusters of small round seeds, which are covered with a description of flour; this, removed by gentle rubbing, constitutes the dye. Two kinds come into the market. The best comes from the interior, principally from the towns of O Badan and Gebla, and the districts of Yaffae and Sjibul Rudfan. The second kind,

brought by the Somalis of the opposite coast, comes from Hurrer. The second quality is not so much valued, and does not realize the price of the kind which comes from the interior. A considerable quantity of the dye is exported to Bombay, being used at Surat by ladies for dyeing silk a light brown-yellow. The Arabs use it as a dye and as a medicine, internally, for leprosy, and externally, in solution, for freckles and pustules. Much of it finds its way to the Persian Gulf, being known as *asberg*." Dr. Vaughan goes on to say that the best quality sells for 24 rupees the maund, while the African variety sells for only 17 or 18 rupees the maund.

Mr. Hanbury<sup>2</sup> states that he showed the specimens he had received to Mr. Alexander Gibson, of Bombay, who was at that time in London. Mr. Gibson suggested to him that it was obtained from *Rottlera tinctoria*. He then proceeded to compare the drug with specimens in the museum of the Linnean Society, and found that Mr. Gibson was correct in his surmise.

Kamala, as found in commerce, is a fine, mobile powder, of a dull red color. Under the microscope it is seen to consist chiefly of translucent, bright red granules mixed with colorless stellate hairs. These hairs give the drug its dull appearance. The glands, Fig. 1, *B*, are

FIG. 1.

*B.* Gland of genuine kamala.*A.* Stellate hair of the same.

spherical, rather irregularly so. Their diameter is from 70 to 120 mkm. (micromillimetres). They are flattened on one side, and are composed of a number of clavate cells enclosed in a pale yellow membrane. The cells are arranged in a radiate manner round a short stalk cell, which is not always visible, occupying the basal side of the gland. From ten to thirty of these cells may be seen on one side; the whole cell, however, contains from twenty to sixty of them. The cells are filled with a red resin, which is soluble in solution of caustic potash, alcohol and ether. On treatment with solution of caustic potash the structure of the gland becomes plainly visible. On appro-

<sup>1</sup> "Pharm. Journ." [1], xii, 385.<sup>2</sup> "Pharm. Journ." [1], xii, 589.

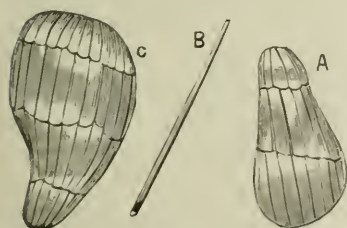
priate treatment, first with alcohol and afterwards with Schultz's solution of sulphuric acid and iodine, the cells are seen to be composed of cellulose, while the enclosing membrane is seen not to be cellulose.

Professor Flückiger<sup>1</sup> says that he examined authentic specimens from the Calcutta gardens. These were taken from *Mallotus philippinensis* (*Rottlera tinctoria*), and he found them to agree entirely with the kamala of commerce.

From this it is plainly evident that the source of commercial kamala has been definitely settled.

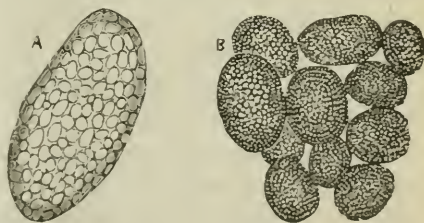
Some years ago Messrs. Allen and Hanbury imported a remarkable kind of this drug from Aden. A full account will be found in "Pharmacographia." Mr. Hanbury forwarded a sample of this to Professor Flückiger, who submitted it to an exhaustive examination.<sup>2</sup> It differs from the ordinary variety in bulk, in having a dark red or violet color. Microscopically examined, it is at once seen to have quite a distinct structure. Solution of caustic potash dissolves the resin contained by the glands and the general structure is easily seen. The glands are cylindrical, somewhat conical, and are composed, like the other, of resin cells enclosed by a membrane. The arrangement of the cells will be best understood by reference to Fig. 2. The glands

FIG. 2.



A. B. Glands of purple kamala.  
B. Simple hair of same.

FIG. 3.



A. New (?) variety of kamala seen dry.  
B. The same seen in solution of caustic potash.

are 170 to 200 mkm. long and from 70 to 100 mkm. broad. The hairs mixed with them are simple and long, when compared with the short stellate hairs of the common kind. Professor Flückiger is quite sure the two kinds are not obtained from the same plant.

Dr. Dymock, in his "Vegetable Materia Medica of Western India," says: "'Wurs,' or 'wurru,' which differs from genuine kamala in being a dark purple color, is the gland of the leaf of a leguminous

<sup>1</sup> "Pharm. Journ." [2], ix, 279.

<sup>2</sup> "Pharm. Journ." [2], ix, 279.



plant, *Flemingia congesta*." He was not able to ascertain if it is collected in India or whether it is imported from Arabia. I have not had the pleasure of seeing Dr. Dymock's book; but it was the note, as above, which appeared in "The Month" of a recent number of the "Pharmaceutical Journal," which first attracted my attention to kamala and its sources. Thinking it would be interesting to know if commercial kamala was entirely the produce of *M. philippinensis*, I obtained samples of the drug from various parts of the country. I find that every one of the specimens obtained from dealers is genuine kamala.

Mr. E. M. Holmes, of the Pharmaceutical Society, has been kind enough to let me have samples of the specimens in the Society's museum. The results of my examination are as follows:

Sample marked "490 b," catalogued "Glands, covering fruit of *Rottlera tinctoria*," is genuine kamala.

Sample marked "490 c," catalogued "Wurrus, first quality," is identical with the purple variety examined by Professor Flückiger and is presumably the one referred by Dr. Dymock to *Flemingia congesta*.

Sample marked "490 d," catalogued "Wurrus, second quality." This is totally different from either of the other two varieties spoken of. I have been unable to find any record of a third kind of this drug. I therefore venture to put before you a short description of this specimen. The glands are from 50 to 170 mkm. long, and from 50 to 100 mkm. broad. When seen with the microscope in a dry state they are translucent and but faintly colored yellow. In form they vary very considerably; in fact, there appears to be no prevailing form. They impart but little color to ether, alcohol or solution of caustic potash. The cells are devoid of any such resin as is seen in the other two kinds. In solution of caustic potash they swell considerably, and their structure is rendered clearly visible. They consist of a mass of cells, composed of cellulose, enclosed by a non-cellulose membrane. The cells are not arranged in any particular manner. The general arrangement is shown, when seen in solution of potash, in Fig. 3, B. The hairs are similar to those found in the purple variety, being quite simple.

On drawing Mr. Holmes's attention to this unknown (?) variety, he informed me that he believed it was the *second* kind mentioned by Dr. Vaughan in his "Notes," and this sample was probably given by him to Mr. Hanbury, who presented it to the Museum.

I trust that some further information regarding the plants yielding the second and third varieties of "wurrus" will soon be forthcoming.

Looking at the last sort from an economic point of view, it would appear to be worthless as a dye, whatever it may be as a medicine.

In conclusion, I beg to tender my thanks to Mr. Holmes, and to Mr. Elborne who has assisted me in obtaining specimens of the drug.—*Phar. Jour. and Trans.*, May 10, 1884, p. 897.

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## WARAS.

BY W. T. THISELTON DYER, C. M. G., F. R. S.

Perhaps I may be allowed to add a few remarks to what is stated about "waras" in Mr. Kirkby's interesting paper in the *Pharmaceutical Journal*. The note contained in the inclosed copy of the "Kew Report" for 1880, p. 50, is, I believe, the origin of the identification of the plant producing the Aden drug with *Flemingia congesta*.<sup>1</sup>

<sup>1</sup> The following is the note referred to :

"*Waras*.—A drug known under this name appears to be exported in considerable quantity from Aden. It is used as a substitute for kamala, a well-known Indian product of *Mallotus philippinensis* (*Rottlera tinctoria* Roxb.). Its origin is quite unknown (see Flückiger and Hanbury, 'Pharmacographia,' pp. 575, 576). At the suggestion of the former, Captain Hunter, Assistant Resident at Aden, obtained specimens of the plant stated to yield waras in Arabia. He has also sent one to Kew with a note stating that it was gathered 'at an elevation of 6,000 feet on Jebel Dthubarah, 60 miles due north of Aden.' The plant sent was immediately identified with a leguminous species, *Flemingia congesta*, Roxb., having of course no affinity with *Mallotus philippinensis*.

"True kamala consists of the epidermal glands, detached by brushing from the fruits of the *Mallotus*. Alcohol extracts from it a splendid red color. The name 'waras' means saffron, and it may be mentioned in support of the notion that a similar substance is yielded in Arabia by perhaps one or more species of *Flemingia*, that dried specimens belonging to this genus stain paper in the herbarium a bright yellow color when washed over with the alcoholic solution of corrosive sublimate used to protect them from the attacks of insects. *Flemingia rhodocarpa*, Bak., from the Mozambique district has its pods covered with a bright red resinous pubescence.

"In the 'Pharmacographia' (2d ed., p. 372) Flückiger and Hanbury state that *Mallotus philippinensis* grows in Abyssinia and Southern Arabia. In a letter, Professor Flückiger doubts whether he and Mr. Hanbury were not mistaken in regard to this. The evidence of specimens in the Kew herbarium only carries the distribution to the west as far as Scinde. There is nothing improbable in its extending to Arabia, the flora of which is still so imperfectly known."

Professor Flückiger, with whom I had corresponded upon the subject, informed me (July 12, 1881) that though he at first objected to *Flemingia* as the source of "waras" he then thought the statement correct.

As the Kew Museum contained no satisfactory specimens of either African or Arabian "waras," we applied to the Resident at Aden to kindly assist us in procuring samples. These reached England in July of last year. In both cases the "waras" itself agreed microscopically with an authentic sample derived from Professor Flückiger, and had the structure figured by Mr. Kirkby. All three also exhibited the characteristic property of turning first bright red, then black, when carefully heated in small quantity on a glass slip over the flame of a spirit lamp.

The sample of Somali "waras" was mixed with seeds of a dull brown color mottled with black. These were found to agree precisely with the seeds of *Flemingia rhodocarpa*, Bak., from the Mozambique, which, as mentioned in the "Kew Report" (l. c.) "has its pods covered with a bright red resinous pubescence." A further scrutiny of the original specimen obtained by Captain Hunter from the neighborhood of Aden, which is in a rather immature state, led Professor Oliver to the conclusion that this also belonged to *Flemingia rhodocarpa*. I believe that the drug is derived from the young pods, and am disposed, therefore, to think that Dr. Dymock is in error in describing it as "the gland of the leaf."

I communicated these further facts to Professor Flückiger, and he wrote to me, October 4, 1883, "I am very much pleased with your statements, and can only say that I most fully agree with your conclusion as to the identity of the Somali "waras" with my original specimen and also that of the seed of *Flemingia rhodocarpa* with those met with in the said drug."

In the new "Official Guide to the Museums of Economic Botany at Kew" (No. 1, p. 45) we accordingly state that "waras . . . consists of the epidermic glands of the young pods of *Flemingia rhodocarpa*, Baker; native of Arabia and East Tropical Africa."

The third variety described by Mr. Kirkby is quite new to me, and I join with him in hoping that some further information about the plant yielding it will soon be forthcoming.

A further most interesting communication on the subject from Major F. M. Hunter, Assistant Resident at Aden, contained a memorandum

giving the complete history of the collection of the drug with a further specimen in fruit of the plant producing it, the pods bearing the epidermal glands still undetached. There can be now no sort of doubt that the "waras" plant is really that described by Mr. J. G. Baker, F. R. S., in the "Flora of Tropical Africa," as *Flemingia rhodocarpa*.

But my colleague, Professor Oliver, F. R. S., whose kindness is only equalled by his sagacity, has made the curious discovery that a *Flemingia* apparently confined to South India, *F. Grahamiana*, W. and A., is not specifically distinguishable from *F. rhodocarpa*; the pods are in fact clothed with the same peculiar epidermal glands so characteristic of that species. The "waras" plant is therefore really to be found in India after all.

In creating a new species for the "waras" plant, Mr. J. G. Baker pardonably neglected the comparison of the material he was working upon with specimens of the species occurring in so remote and botanically widely severed an area as the southern part of the Indian peninsula.

I trust that room may be found for Major Hunter's memorandum, which I append in its entirety.

*Notes on "waras" collected at Harrar in February and March, 1884.*

"In the neighborhood of the city 'waras' is not now raised from seed sown artificially, and it is left to nature to propagate the shrub in the surrounding terraced gardens. The plant springs up, among jowari, coffee, etc., in bushes scattered about at intervals of several yards more or less. When sown, as among the Gallas, it is planted before the rains in March. If the soil be fairly good a bush bears in about a year. After the berries [pods] have been plucked the shrub is cut down to within six inches of the ground. It springs up again after rain and bears a second time in about six months, and this process is repeated every second year until the tree dies. Rain destroys the berry [pod] for commercial purposes, it is therefore only gathered in the dry season ending about the middle of March. The bush grows to a maximum height of six feet, and it branches close to the ground. The growth is open and the foliage sparse. Each owner has a few acres of land.



"In the middle of February, 1884, the following processes were observed :

"The leaves [? fruiting shoots] of some plants were plucked and allowed to dry in the sun for three or four days. (The picking is not done carefully and a considerable quantity of the surrounding twigs, etc., is mixed with the berries [pods].) The collected mass was placed on a skin, heaped up to about six or eight inches high, and was tapped gently with a short stick about half an inch thick. After some time the pods were denuded of their outer covering of red powder which fell through the mass on to the skin. The upper portion of the heap was then cleared away and the residual reddish green powder was placed in a flat woven grass dish with a sloping rim of about an inch high. This receptacle was agitated gently and occasionally tapped with the fingers, the result being the subsidence of the red powder and the rising to the surface of the chaffy refuse, which latter was carefully worked aside to the edge of the dish and then removed by hand. This winnowing was continued until little remained but red powder. (No great pains are even taken to eliminate *all* foreign matter.) A rotl was sold in 1884 for about 13 piasters = 1 rupee 10 as. nearly.

"'Waras' is sent to Arabia, chiefly to Yemen and Hadhramaut, where it is used as a dye, a cosmetic, and a specific against cold. In order to use it, a small portion of the powder is placed in one palm and moistened with water, the hands are then rubbed smartly together, producing a lather of a bright gamboge color, which is applied as required."—*Pharm. Jour. and Trans.*, May 17, 1884, p. 917, and May 31, p. 969.

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**IODOFORM PLASTER.**—Dr. Pope recommends the use of this plaster in cases of glandular enlargement, etc. In the cases in which he has tried it (*Wiener Medic. Blätter*) there was a marked diminution in the size of the tumor, or the amount of effused fluid, in what may be considered a short time, that is ten days. The formulas he uses are (1) *Emplastrum iodoformi forte* : 1 part iodoform to 2 parts emplastr. adhesivum and emplastr. plumbi (2) *Emplastr. iodoformi mite* : 1 part iodoform to 6 parts of the plasters named. The plaster is spread on leather, and is left to remain *in situ* for six days. The strong preparation is recommended in glandular enlargements, etc. The weaker proves useful in the case of boils, minor injuries, etc.—*Medical Press and Circular*; *Louisv. Med. News*, April 26.

## THE BITTER SUBSTANCE OF HOPS.<sup>1</sup>

BY DR. H. BUNGNER.

Little that is definite is known of the substances to which the hop owes its bitterness. Lermer has succeeded, it is true, in separating from hops a crystallized odorless substance, insoluble in water, an alkaline solution of which has a marked bitter flavor, and which easily changes on exposure to the air, assuming a resinous form. According to Lermer, the formula of this substance is  $C_{32}H_{50}O_7$ ; it possesses the properties of a weak acid and forms a characteristic copper salt, which is soluble in ether. This hop bitter is, however, produced from the hop by a very roundabout process, by treatment of the extract with alkalies; it is not therefore regarded by many as present in this form in the hop, and they hold that it is only produced by the action of the alkalies. On the other hand, however,ETTI, by a complicated extracting process, but without using an alkali, succeeded in producing a bitter substance from hops, which is, however, soluble in water.

Several experiments convinced me that there really existed in hops a crystallizable substance, insoluble in water, the alcoholic and alkaline solution of which had a bitter flavor, in short, which possessed all the properties of Lermer's hop-bitter acid. Petroleum ether is the best practical solvent in use for its isolation, as it does not dissolve the majority of the remaining constituents of the hop, especially the hop-resin, which they contain in considerable quantity. Still, the extraction of hop-bitter acid from hops is a troublesome and thankless job, the petroleum ether taking up certain substances which add greatly to the difficulty of purifying the crystals. On the other hand, we can readily and quickly attain our object, if we employ for our original material fresh lupulin from unsulphured hops.

The following process has furnished me the best results:

The lupulin is first freed from gross impurities (hop seed, leaves, etc.), and then covered with petroleum ether boiling at a low temperature ( $40^{\circ}$  to  $70^{\circ}$ ) in stoppered flasks. The mixture is shaken up from time to time. After twenty-four hours, by means of a Zulkowsky filter immersed in the mass, and with the aid of a suction pump, the dark brown solution is drawn off; then fresh ether is poured on to the lupulin and it is allowed to stand for another twenty-four hours. After this process has been three times repeated, nearly everything the

<sup>1</sup> "The Brewers' Guardian," from the "Zeit. f. d. gesammte Brauwesen."

petroleum will dissolve has probably been extracted. The solutions are put together and the petroleum ether distilled off *in vacuo* at a low temperature, until there remains in the flask a dark brown syrup, which on cooling solidifies into a crystalline mass. This is pulverized and turned on to a filter composed of a large funnel, in which a smaller funnel covered with muslin is inserted. With the aid of a suction pump, the greater portion of the thick, crude solution can be filtered through. There remains on the filter a highly colored crystalline "cake," which should be pulverized with a small quantity of petroleum ether and again filtered. After this operation has been repeated three or four times, we obtain an almost colorless mass, consisting of hop-bitter acid, contaminated by small quantities of a fatty substance and a substance which I could not isolate, and which I had at first great trouble in separating from the hop-bitter acid.

If we do not wish to utilize this crude substance at once it will be necessary to melt it in the water-bath and pour it into a bottle under close seal, where it will at once crystallize and solidify. If it remains exposed to the atmosphere it will soon become sticky and turn partly into resin. Six kilos of lupulin, which included a large proportion of sand, furnished 400 grams of crude hop-bitter acid. The first experiments in crystallization with petroleum ether gave poor results; it is difficult to produce the acid pure in large quantities by this process, as a small quantity of the above substance obstinately clings to it, and it readily assumes a non-crystallizable form. Our object is more readily attained if we crystallize it once from alcohol, for which purpose we dissolve it in a little lukewarm alcohol, then quickly cool the solution; flakes of a fatty substance will be separated, which are removed by filtration with the aid of a suction pump. Then we throw a few small crystals of the acid into the solution, and after a short time crystallization commences. As soon as it appears to be ended, the mother solution is removed with the aid of a platinum cone, and the crystals washed with a little cold alcohol. The alcoholic mother solution, which still contains the chief part of the bitter acid, must be quickly evaporated, and the residue consigned to a flask. The acid crystallized from the alcohol is then recrystallized several times from petroleum ether. In order to quickly dissolve the bitter substance, it should be carefully melted in a flask and double its volume of ether gradually added; on its cooling, we obtain beautiful prismatic crystals, which attain a length of 1 cm., and become perfectly pure after

four or five crystallizations. The mother solutions must be speedily evaporated if we still wish to obtain crystals; after a time they will only furnish a resinous residuc.

The hop-bitter acid melts at  $92^{\circ}$  to  $93^{\circ}$ . It is easily soluble in alcohol, ether, benzol, chloroform, sulphide of carbon and vinegar; to a lesser extent in cold petroleum ether, and not at all in water.

In the analysis I obtained figures which correspond best with those calculated from the formula  $C_{25}H_{35}O_4$ .

Calculated.	Obtained.					
	2. Crystal.		3. Crystal.	5. Crystal.		6. Crystal.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
C.....75.19	74.79	74.83	74.9	75.04	75.05	75.07
H..... 8.77	8.97	8.90	8.85	8.87	8.83	8.80
O.....16.04						

If we shake up the other solution of bitter substance with an aqueous solution of acetate of copper, the ether will assume a green color, and gradually deposits a green crystalline powder, a cupreous combination of the bitter acid. It is difficult to obtain in a pure state, as the solutions are already subject to slight decomposition, accompanied by a small deposit of copper oxide. This combination is readily soluble in alcohol, to a lesser extent in ether, and is insoluble in water.

In the course of analysis I obtained the following figures :

C.....	69.4	per cent.	69.3	per cent.
H.....	7.95	"	7.98	"
Cu.....	7.20	"	7.18	"

If we suppose that the copper combines with two molecules of hop-bitter acid, by the decomposition of one of its atoms, H, we obtain the formula  $C_{50}H_{68}O_8$  Cu. This combination will contain 69.87 per cent. C, 7.91 per cent. H and 7.33 per cent. Cu. The figures obtained do not perfectly coincide with those calculated; it is nevertheless probable that the formula is correct, and the combined substance analyzed was not perfectly true.

I have already referred to the fact that solutions of hop-bitter acid, if left standing too long, assume a yellow color, and on evaporation leave only a yellow resinous residuc. This, as its reaction shows, evinces a complete analogy with the crystallized acid. The dark colored mother solution, from which the crystalline cakes of bitter acid are obtained, contains a large proportion of this resinous compound,



which can be isolated by treatment with a weak soda-lye; this substance, like the crystallized acid, is soluble in alkalis, and can be precipitated from an alkaline solution by an acid. Old hops furnish far less crystallizable acid than new hops; from some samples I have been able to obtain only a few crystals; the remainder had been transformed into the resinous modification.

If pure hop-bitter acid be pulverized and exposed to the atmosphere it soon turns yellow and the surface assumes a resinous consistency. At the same time, a more pronounced odor of fatty acids and aldehydes is apparent. Still more rapidly will this oxidation occur if a thin layer of an alcoholic solution of the acid is allowed to evaporate in the air. On the other hand, we can allow hop oil to stand for days without its odor being perceptibly changed; it appears to me more than probable that the peculiar smell of old hops is due far more to the oxidation of the bitter substance than to the oxidation of oil.

Hop-bitter acid appears to possess the character of an aldehyde and of a weak acid; for the present I am not in a position to state its constituents more clearly. Most of the oxidizing processes have an energetic effect on it, forming also considerable quantities of valerianic acid.

The question as to whether the hop owes chiefly to this acid and its resinous modifications the property of imparting a pronounced bitter flavor to a solution, I must for the present leave unanswered. The acid and its isomer are both insoluble in water; they are, on the other hand, very readily dissolved in hop oil; they also furnish a tolerably bitter solution, if boiled for a long time in water, probably on account of their gradual decomposition. I will not for the present go further into the subject, as I hope soon to be in a position to give more definite information.—*Phar. Jour. and Trans.*, June 14, 1884, p. 1008.

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CIDER AS A PREVENTIVE OF STONE, is attracting attention in France. Dr. Dennis Dumont examined the records of the Caen Hospital, and found that in fifty-nine years only four cases of stone in the bladder were admitted. He attributes this immunity to the fact that the residents of the country are cider drinkers, which beverage is a decided diuretic. Enquiry showed that the residents of other cider-drinking districts enjoy the same immunity from stone.—*Weekly Med. Review*.

## A NEW GLUCOSIDE FROM STRYCHNOS NUX- VOMICA.

BY WYNDHAM R. DUNSTAN,

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and Demonstrator of Practical Chemistry in the School of Pharmacy;*

AND F. W. SHORT.

*Assistant Demonstrator of Practical Chemistry in the School of Pharmacy.*

### FIRST NOTICE.

In the course of a complete chemical and botanical investigation of *Strychnos Nux-vomica*, with which we have been occupied for some time past (the results of which will shortly be published), a hitherto unnoticed constituent of the fruit has been discovered, and on further examination proved to be a new glucoside.

The body was first isolated from the pulp in which the seeds lie embedded within the fruit. This pulp has never received a full chemical examination. It was tested for strychnine by Hanbury ("Pharmacographia"), and the presence of this alkaloid definitely shown. In order to fully examine the constituents of nux-vomic pulp, it was dried and exhausted with that mixture of chloroform and alcohol (100:25) which we have previously shown to be the best and most suitable solvent for extracting the alkaloidal constituents from nux-vomica seeds. The exhaustion was effected in the apparatus for hot repercolation and continuous extraction devised by us and described in the "Pharmaceutical Journal," [3], xiii., 633. The chloroform-alcohol percolate as it cooled deposited crystals; these were separated and dissolved in alcohol and the solution spontaneously evaporated. In this way a mass of nearly colorless prismatic crystals was obtained. These crystals fused when strongly heated, then charred, and finally oxidized without leaving any ash; they contained no nitrogen, as was shown by their yielding no sodium cyanide when heated with metallic sodium. A larger quantity of pulp was next exhausted with chloroform and alcohol. The crystals deposited from the solution were thrice recrystallized from ordinary alcohol, and finally again from absolute alcohol. The perfectly colorless prismatic crystals thus obtained were analysed by combustion with lead chromate, when the following results were obtained:

	Found.		Calculated.	
	I.	II.	For $C_{25}H_{34}O_{14}$ .	For $C_{25}H_{36}O_{14}$ .
C.....	53.38	53.77	C..... 53.76	C..... 53.57
H.....	6.61	6.59	H..... 6.09	H..... 6.43
O.....	40.01	39.64	O..... 40.15	O..... 40.00
	100.00	100.00	100.00	100.00

It is seen from these results that the formula of the substance which we propose to call *loganin* (Loganiaceæ) is most probably  $C_{25}H_{34}O_{14}$ , although this formula will require confirmation in other ways, for these empirical results might also lead to the formula  $C_{25}H_{36}O_{14}$ . The first formula is that given to the glucoside arbutin (from *Arctostaphylos Uva-ursi* and *Pyrola umbellata*) by Hlasiwetz and Habermann (*Ann. Chem. Pharm.*, clxxvii., 339), although, according to Schiff, the substance analysed by these chemists was a mixture of arbutin ( $C_{12}H_{16}O_7$ ) and methyl arbutin ( $C_{13}H_{18}O_7$ ). Habermann has since (*Monats. f. Chem.*, iv., 753) upheld the correctness of the original formula by further experimental results. But, be this as it may, the glucoside from *Strychnos Nux-vomica* is shown to be radically distinct from both arbutin and methyl arbutin, by a much higher melting point, and by not yielding quinol (hydroquinone) or methyl-quinol when acted on by diluted sulphuric acid.

The crystals of loganin lose no water when slowly heated from  $100^{\circ}$ — $180^{\circ}$ C. When further heated they liquefy at  $215^{\circ}$ C., this observation being made with the substance very gradually heated on the surface of mercury contained in a beaker, supported on a non-conductor in an air-bath—in fact, by a modification of the method for determining melting points originally suggested by Professor Redwood. This melting point was redetermined, using a capillary tube sealed at one end, into which the substance was introduced, the tube being slowly heated in a bath of glycerol (glycerin). It was noticed that the crystals softened at  $200^{\circ}$ C. and become transparently liquid at  $215^{\circ}$ C. Loganin is easily soluble in water and alcohol, less soluble in ether, chloroform and benzene. The aqueous solution is not precipitated by any of the alkaloid reagents, neither by lead acetate nor silver nitrate; further the solution is not affected by ferric chloride. Loganin develops no color when acted upon by nitric acid or other oxidizing agents, although it is powerfully oxidized by a mixture of sulphuric acid and potassium dichromate; bromine water is decolorized by a solution of the glucoside. The most characteristic

reaction of the substance is found in its behavior with concentrated sulphuric acid. A very small quantity of loganin, when gently warmed with a few drops of concentrated sulphuric acid, yields a fine red color, which, on standing, develops into a deep purple. An aqueous solution of loganin does not reduce Fehling's solution. When boiled with dilute sulphuric acid the glucoside is resolved into a glucose (reducing Fehling's solution) and a body which we propose to call *loganetin*. This substance, like loganin, gives the characteristic reaction with sulphuric acid although the purple color does not develop so rapidly. Loganetin is soluble in water and alcohol, less soluble in ether and chloroform. The aqueous solution of loganetin is not precipitated by silver nitrate or lead acetate, nor colored by ferric chloride. The substance gives no color when acted on by nitric acid. We are now engaged in a further study of loganetin.

From the amount of loganin obtained from the pulp on which we worked it appears to exist to the extent of from 4 to 5 per cent. in the dried material.

We now proceeded to examine the seeds of *Strychnos Nux-vomica* for the same glucoside, although its occurrence has never been noticed by other observers, nor does any mention of such a constituent appear in the original analysis of Pelletier and Caventou. About one hundred grains of the finely powdered seeds of *Strychnos Nux-vomica* were exhausted with boiling alcohol. The alcoholic solution was treated with tannin to precipitate alkaloid, and the excess of tannin was removed, together with coloring matter, by evaporating to dryness with lead hydrate. The dry residue was exhausted with absolute alcohol; this when evaporated left a small quantity of residue giving the characteristic purple color which loganin forms with sulphuric acid. The aqueous solution of the residue did not reduce Fehling's solution until it had been boiled with dilute sulphuric acid. In a second experiment the alcoholic solution of the seeds was evaporated to dryness, extracted with water, and the aqueous solution precipitated by lead oxyacetate. From the filtered liquid the alkaloid was nearly entirely precipitated by tannin. The solution after filtering was evaporated to dryness and extracted with chloroform. When the chloroform was evaporated, a residue was obtained which gave the reaction for loganin with sulphuric acid very distinctly. We have since found that the presence of loganin may be detected with great readiness in the alcoholic extract



of nux-vomica which is official in the British Pharmacopœia by extracting it with boiling ether, which removes also a little oil with a trace of alkaloid. The residue from the evaporation of the ethereal solution gives the reaction of loganin when gently warmed with sulphuric acid.

It has been shown in this preliminary note that the pulp of the fruit of *Strychnos Nux-vomica* contains to the extent of 4 or 5 per cent. a new glucoside which we have termed loganin, the chemical composition and properties of which have been described. It has also been shown that loganin is contained in small quantity in the seeds of *Strychnos Nux-vomica* and in the pharmaceutical preparations made from them. In the future we hope to be able to indicate the chemical constitution of loganin and loganetin and to discover the relations (if any) of these bodies to the alkaloids strychnine and brucine. The physiological action of loganin will also receive attention. The pulp of *Strychnos Nux-vomica* was collected and prepared for us through the kindness of Dr. W. C. Ondaatje, F.L.S., of Galle, Ceylon, to whose invaluable services in aiding this investigation we shall allude in a forthcoming paper. For this is the least of our obligations to him.—*Pharm. Journ. and Trans.*, June 21, 1884, p. 1025.

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### BOLIVIAN CINCHONA FORESTS.<sup>1</sup>

The great progress made in the acclimatization of cinchona trees in India, Ceylon, and elsewhere, has awakened the Governments of countries where the plants are indigenous to the necessity of conserving from reckless destruction, and re-planting denuded forests, so as to be able to keep up the supply of this valuable product.

In Bolivia, since 1878, according to the report of the Netherlands Consul, private individuals and land owners have taken up the question with great earnestness, and at the present time on the banks of the Mapiri, in the department of La Paz, there are over a million of young trees growing.

New plantations have also sprung up in various other localities, either on private ground or that owned by Government. The competition of India and Ceylon in supplying the markets, has had also the effect of inducing more care in collecting and also of revisiting old

<sup>1</sup> From the "Journal of the Society of Arts," June 13, 1884.

spots, often with the result of a rich harvest of bark which had been left on partly denuded trunks, and the opening up of new localities. The new shoots springing up from the old stumps have yielded much quill bark, and the root bark of the old stumps has also been utilized.

The re-planting entails very little expense. The Indian tenant on an estate has a house and land from the owner (hacienda) of the estate. For this he binds himself to work for two to four days a week, at from 28 to 36 cents per day, women and children obtaining 16 to 21 cents per day. Thus the planting, weeding, etc., during the first two years, is but nominal in expense; after this period the trees may be left to themselves.

On Government land the expense is greater, as after an application being made, the land is put up to public auction, and may fetch a very low or a higher price, according to the bidding. The land secured, contracts are made with natives of the lower class to clear the forest and plant cinchona. The contracts are often sublet to Indians. The young plants are planted from five to six feet apart, with banana trees between, on account of their rapid growth and the shade the latter afford. From March to June, after the wet season is over, is the best time for planting, and the contractor keeps the plantation free from weeds and in good order for twelve months, when it is handed over to the owner. The following is given as the cost of the Mapiri river plantation of an area from sixty or more miles in extent:—

	Dollars.
Ground.....	1,200
300,000 plants at 0.14 dollars.....	42,000
Superintendent, buildings, etc.....	4,400
Interest.....	4,800
<hr/>	
Total.....	52,400

Till the plants are above two years of age, they are liable to die from drought or the attacks of ants, and during 1878 many thousands died from these causes. At the end of the fourth year some proprietors begin to collect the quill bark by the method of coppicing.

It is feared by some that should this new venture be successful, it will prove a dangerous rival to the plantations of India, Ceylon and Java, and lower the price of bark considerably.—*Pharm. Jour. and Trans.*, June 28, 1884, p. 1054.

## INQUIRY INTO THE REDUCING ACTION OF VASELINE AND PARAFFIN ON PERMANGANATE OF POTASSIUM AND NITRATE OF SILVER WHEN CONTAINED IN PILLS.

BY GEO. SMITH, F. C. S.

Mr. Martindale suggested, in a letter to the "Pharmaceutical Journal" for January 13, 1883, the use of a mixture of vaseline, 2 parts, paraffin wax, 1 part, and kaolin, 3 parts, as a convenient and non-oxidizable excipient for making permanganate of potassium into pills. On January 28, 1883, some pills containing 2 grains of the salt in each, and 3 grains of the above excipient, were made by the writer, and coated at the same time with a solution of gum sandarac in absolute alcohol, as recommended by Mr. Martindale. Owing to other engagements their examination was not attempted till June 26th last.

The results obtained may be of interest to those who may have occasion to prescribe or dispense this remedy.

As a preliminary, on boiling one of the pills in a little distilled water, ample evidence of the presence of unreduced permanganate was obtained.

Three of the pills containing 6 grains of the salt (= .3888 gram) were treated with distilled water (under 35°C.), until all soluble permanganate was extracted. The resulting cloudy solution was made up to 500 cc., and estimated with a volumetric solution of oxalic acid containing 6.3 grams per litre. A mean of three estimations made on 50 cc. at each time, proved that 70 per cent. of the permanganate originally present in the pills had been reduced.

It was observed that the sandarac coating reduced the permanganate as fast as it went into solution at first, and that only after the former was completely oxidized, did the characteristic deep reddish purple color of the permanganate begin to appear. Obviously this reduction was considerable, and to avoid it, the pills were carefully scraped, and the coating removed as completely as possible. One gram of the scraped mass (representing .4 gram of the permanganate) was broken down and treated with successive portions of distilled water (under 35°C.) until all the soluble contents were removed, and the resulting solution allowed to settle in a beaker. When moderately clear, it was decanted and passed through glass-wool into a flask, the residues

washed, and the whole made up to 500 cc. Two series of estimations were made on 50 cc. and 100 cc. each of the solution. The following are the numbers obtained:

- (a) 50 cc. required 6.7 cc. oxalic solution to complete decolorization.
- (b) 50 cc. required 6.6 cc. oxalic solution to complete decolorization.
- (c) 100 cc. required 13.7 cc. oxalic solution to complete decolorization.
- (d) 100 cc. required 13.6 cc. oxalic solution to complete decolorization.

Mean = 13.53 cc. of volumetric solution of oxalic acid required to decolorize 100 cc. of permanganate solution.

Then  $13.53 \text{ cc.} \times .00314 = .04248 \text{ K}_2\text{Mn}_2\text{O}_8$  (found) = 53.1 per cent.

The filtration through glass-wool did not entirely free the liquid from suspended manganic oxide. This interfered slightly with the accuracy of the readings. It is noteworthy that the *absence of the resinous coating* increases the percentage of unreduced permanganate from 30 to 53.1.

*Estimation of Pills containing Silver Nitrate.*—These pills, when examined, had been made eighty-five days. Two strengths were estimated (No. 1) containing 2 grains, and (No. 2)  $\frac{1}{2}$  grain each respectively of the salt. Both were made up to a total weight of 5 grains each by Mr. Martindale's excipient. They were *not coated*.

One gram of No. 1 (representing .4 gram of silver nitrate) was carefully broken down under distilled water at the ordinary laboratory temperature (about 20°C.), by means of a glass rod. The silver nitrate entered readily into solution. The total liquid collected was allowed to settle, then filtered through glass-wool, the residue and wool being washed till free from traces of silver salt, and the solution made up to 500 cc. Some finely divided kaolin still remained suspended in the liquid. This prevented an accurate gravimetric determination. Instead, two series of separate volumetric estimations were made on 50 cc. and 150 cc. respectively, using a solution of ammonic thiocyanate (of which 1 cc. had been ascertained to equal .0171 gram of commercial crystals of silver nitrate) with iron alum as indicator. The following are the numbers obtained:

- (a) 50 cc. silver solution required 2.4 cc.  $\text{NH}_4\text{CNS}$  solution.
- (b) 50 cc. silver solution required 2.35 cc.  $\text{NH}_4\text{CNS}$  solution.
- (c) 150 cc. silver solution required 7.1 cc.  $\text{NH}_4\text{CNS}$  solution.
- (d) 150 cc. silver solution required 7.05 cc.  $\text{NH}_4\text{CNS}$  solution.

Mean = 4.725 cc.  $\text{NH}_4\text{CNS}$  solution required to completely precipitate 100 cc. of silver nitrate solution.

Then  $4.725 \times .0171 = .08079 \text{ AgNO}_3$  (found) = 100.99 per cent.



The whole of No. 2 batch of pills was next estimated. One dozen were made, and it was considered desirable to estimate the *whole* of the silver nitrate *known to be contained in them* (= 6 grains = .3888 gram), after the high results obtained by operating on a portion of No. 1. The *modus operandi* was the same as with No. 1, and the following are the figures obtained :

(a) 150 cc. silver solution required 6.75 cc.  $\text{NH}_4\text{CNS}$  solution.

(b) 150 cc. silver solution required 6.7 cc.  $\text{NH}_4\text{CNS}$  solution.

Mean = 4.483 cc.  $\text{NH}_4\text{CNS}$  solution to completely precipitate 100 cc. of silver nitrate solution.

Then  $4.483 \times .0171 = .07666 \text{ AgNO}_3 \text{ (found)} = 98.5 \text{ per cent.}$

These numbers require no comment, the high results obtained with No. 1 pills are probably owing to the imperfect mixing of the ingredients. Both numbers show conclusively that the paraffin excipient has no reducing action on nitrate of silver.

In conclusion, Professor Armstrong suggests that part of the reduction observed in the permanganate of potassium may be due to a contamination of the vaseline and paraffine wax with solid homologues of the olefine series ( $\text{C}_n\text{H}_{2n}$ ). On the other hand the increase of over 23 per cent. of unreduced permanganate obtained when the influence of the sandarac coating is, as far as possible, eliminated, makes it desirable to continue the experiments further *on uncoated pills, or pills coated with melted paraffin mixture only*. The writer finds that pills coated with a mixture of white vaseline and paraffin wax can be sugar coated in the usual manner without much difficulty. In any case, the foregoing experiments prove that sandarac coating, or any organic resinous coating whatever, is inadmissible with pills containing permanganate of potassium.

Further experiments will be undertaken with permanganate, including, at the same time, trials with authentic specimens of tetrachloride of gold, and the double chloride of gold and sodium. If reduction should take place, and appear to arise from any impurity contained in the vaseline or paraffin wax, then a process may perhaps be devised to get rid of this drawback.

My thanks are due to Professor Armstrong, for kindly allowing this investigation to be carried out in the laboratory of the Technical College, Finsbury.—*Phar. Jour. and Trans.*, July 12, 1884, p. 21.

## NOTE ON TU-TU (*CORIARIA RUSCIFOLIÆ*.)

BY T. H. HUSTWICK.

The "tu-tu" plant (pronounced "toot," the final vowel in many Maori words being only an aspirate or lip sound is dropped by Europeans) is indigenous to New Zealand. It grows luxuriantly where situation is favorable, and prefers an exposed site on rising ground, with a dry friable soil; its average height, when mature, may be taken at about 5 feet, of a shrubby herbaceous character, and with its spreading branches covering a considerable extent of surface. Surrounded by sombre ferns and withered grasses, the effect of its glossy dark green foliage is very striking.

Tu-tu, though commonly spoken of as a poison, is such only under certain conditions, and even not then to all animals; the horse, goat, and pig being said to be entirely proof against it under all circumstances; while, conditions being favorable, cattle and sheep often fall victims to it. The season of its greatest activity is in spring; then, the wide spreading roots throw up numerous tender, succulent shoots, which are eaten with avidity by sheep fresh from the hills, where dry grasses and ferns have been the rule. Cattle browse on the young leaves, and when coming to them fresh from other pastures, or exhausted by labor or travel, nearly always with fatal effects. It is said that later in the year the poisonous property is greatly diminished; that even when most virulent its effects are much ameliorated by a previously full stomach, and that the system can become accustomed to it by gradual use. Animals suffering from the effects of this plant are said to be "tooted." Its principal action seems to be on the brain and nervous centres, and produces a condition similar to "staggers." The animal becomes stupid and lethargic, until roused into a fit of mad frenzy by any trivial circumstance, during which it is dangerous for man or beast to be in the way, the frenzy recurring at rapidly decreasing intervals, until death results in a few hours from sheer exhaustion. The only remedy that appears to be used is bleeding from the jugular vein, and that with very poor success, not one in ten being benefited, while the exceeding danger attending its use causes it to be practiced only under exceptional circumstances. I am not aware what is the effect of the green herb on man, but singularly enough the "berries" when ripe are grateful and refreshing to the thirsty palate, care being taken to reject the seeds. A common method of utilizing

the fruit is by tying a few bunches in a handkerchief and sucking the juice through it. Small birds are very partial to the ripe fruit and no injurious effect on them is apparent; most probably the seeds are voided by them entire. In the early days of the colony, when bullock labor was universal, whole teams were sometimes destroyed or disabled in a single night by this pernicious plant, rendering great care necessary in the choice of a camping place. The immunity enjoyed by the goat in respect of this plant was some years ago made use of on the Flaxbourne sheep run, a large number of these animals being procured for the especial purpose of securing its eradication. That an animal to whom the varied contents of a choice flower garden are a comestible delicacy should be proof against this particular plant is not to be wondered at, but why the plant should be so powerfully toxic as regards other ruminants is a matter for surprise.—*Phar. Jour. and Trans.*, July 12, 1884, p. 22.

## THE NOMENCLATURE OF THE ALKALOIDS OF *ATROPA BELLADONNA* AND *DATURA STRAMONTIUM*.<sup>1</sup>

BY E. SCHMIDT.

The author having received several inquiries from physicians and others as to what substance was to be understood under the term "daturine," and in what it differed from atropine, answers the question in this paper upon the basis of the investigations carried on by himself and by Ladenburg. He points out that in those investigations it was ascertained by different methods that the two alkaloids, atropine and hyoseyamine, are contained in *Atropa Belladonna* as well as in *Datura Stramonium*. The experiments of the author showed that in both plants the principal part of this alkaloidal mixture consists of atropine, having a melting point of 115° to 115.5°C., the quantity of hyoseyamine remaining in the mother liquor after the crystallization of the atropine being considerably smaller. According to the author's experience the yield of "daturine," which name is used to describe the basic mixture isolated from *Datura Stramonium*, varies very considerably according to the quality of the seed. For instance, four samples of thorn-apple seed from different sources yielded from 5 kilos respectively

<sup>1</sup> From the "*Archiv der Pharmacie*," xxii, 329.

12.5, 18.4, 2.6 and 10.2 grams of yellowish white crude "daturine." From 50 to 70 per cent. of this crude daturine consisted of pure atropine melting at  $115^{\circ}$  to  $115.5^{\circ}\text{C}$ . Moreover, a preparation of crude "daturine" received from Herr Trommsdorff, of Erfurt, from which a first crystallization had been removed, yielded still nearly 45 per cent. of pure atropine. Similar relations were also observed in the crude "atropine" from belladonna root. Ten grams of crude "atropine prepared by the author yielded in repeated spontaneous evaporation of its solution in alcohol between five and six grams of shining acicular crystals of atropine, melting at  $115^{\circ}$  to  $115.5^{\circ}\text{C}$ . Similarly ten grams of crude "atropine," supplied by Herr Trommsdorff, contained rather over six grams of pure atropine. It appeared probable that the mother-liquors still contained considerable quantities of atropine, probably hindered from crystallizing by the admixture of other bases, and in this respect no essential difference was observed between the mother-liquors of crude "atropine" and those of crude "daturine."

In the crude mixtures from belladonna root and thorn-apple seed examined by the author, and mostly prepared by him, the larger proportion of each sample consisted, as mentioned above, of atropine. The remaining and smaller portion, which was much more difficult to crystallize, consisted of hyoscyamine and probably other bases, and their decomposition products. The relative proportions would appear, however, not to be constant, otherwise it would be difficult to reconcile with this experience Ladenburg's statement that in *Datura Stramonium* he found the light alkaloid, hyoscyamine, to preponderate. The author mentions that under both the names "atropine" and "daturine" he has met in commerce with beautifully crystallized specimens of alkaloid that proved to be chemically and physically identical.

As therefore the investigation of Ladenburg does not, any more than that of the author, connect the name "daturine" with a particular chemical individuality, the author thinks it desirable, in order to avoid doubt and error, that this name should be dropped out from chemical literature and prices current, and that the alkaloids should be described by the names agreeing with their chemical characters. Consequently, leaving out of the question hyoscyne, which Ladenburg found in the henbane together with hyoscyamine, Herr Schmidt would provisionally characterize only two plant bases having a mydriatic action: atropine, melting at  $115^{\circ}$  to  $115.5^{\circ}\text{C}$ ., and hyoscyamine, melting at  $108.5^{\circ}\text{C}$ . Duboisine is, according to Ladenburg, in the pure condition, identical



with hyoseyamine, and the belladonnine of Hübschmann and of Kraut is probably a mixture of atropine with oxyatropine (Ladenburg and Roth). Should it be desired to differentiate between chemically identical atropine according to its origin, it would be simply to make a distinction between an atropine from *Atropa Belladonna* and one from *Datura Stramonium*, but not between atropine and daturine.—*Phar. Jour. and Trans.*, July 12, 1884, p. 29.

## INDIA RUBBER AND GUTTA PERCHA CULTIVATION IN CEYLON.

*From the Report of the Director of the Royal Botanic Gardens.*

*India Rubber.*<sup>1</sup> *Ceara*.—In Ceylon a planted area of 977 acres is credited to this kind of rubber, but it has not yet appeared among our exports. Since it has been ascertained that the quality is excellent,<sup>2</sup> cultivators have been endeavoring to discover a means by which the milk can be obtained at a cost sufficiently low to give a return, but without, as yet, encouraging results. The removal of the outer separable bark, as practiced in the experiments referred to in my last report, has been objected to on the ground that the bark formed in its stead is of a different character, very hard and inseparable from the green layer a second time. Instruments have therefore been devised for bleeding without such removal. A knife with two parallel blades, which took out a strip of bark, has been modified into one in which the very sharp cutting edges meet to form a V, the basal angle during use being at the cambium. Another invention avoids all cutting, being a double spur-like wheel with sharp but guarded points which puncture the bark without further injury. The milking (one can scarcely call it tapping) has also been practiced on trees of various ages and at different intervals and seasons. While it is found that the yield of individual trees varies extremely,<sup>3</sup> none of the experimenters is satisfied that the small quantity obtainable by present methods is sufficient to make the cultivation profitable at the existing price of rubber. Mr. Wall, however, who states that hundreds of young trees have been bled *daily* with the "prieker" for some weeks, and that thus a cooly can collect about half a pound of dry rubber per diem, thinks that, if trees will bear this treatment for two hundred and forty days in the year, the cultivation would be remunerative. It appears evident that milking must be repeated at frequent intervals, and (as often already pointed out) the cultivation be

<sup>1</sup> The Import of Caoutchouc Into Great Britain during 1882 amounted to nearly 20,000,000 pounds.

<sup>2</sup> I am informed that as much as 1s. a pound has been obtained for Ceylon Ceara rubber.

<sup>3</sup> This is to be expected; for it should be recollected that the "milk" in plants is quite distinct from their sap, and is contained in special channels. It has no nutritive function, but, like the alkaloids in cinchona, is rather of the nature of an excretion. Its removal, therefore, *per se*, inflicts little or no injury on the plant.

conducted on a large scale. Much of the 35,000 acres in private hands in Ceylon, at present growing nothing but *Lantana* and other weeds, is suitable for this hardy plant, which costs nothing to cultivate, affords a substance of a value which is continually increasing, and awaits only the discovery of a process by which the latter can be cheaply and exhaustively extracted.

*Castilloa Rubber*.—From a single tree at Perádeniya a considerable crop of seedlings was raised. The fruits ripened at the end of May; they are little, white, pointed nuts, about half an inch long, covered by a bright orange pulp, and some twenty to thirty are crowded together on the fleshy flattened scaly receptacle, forming collectively what is called a compound fruit; about half of the fruits ripen and contain each a single seed. I have already expressed my opinion as to the suitability of this tree for cultivation by a Forest Department as a source of prospective revenue; and as comparatively few of the plants were disposed of to private persons, I made an endeavor to get plantations of this valuable tree formed at Ratnapura and Kalutara. The plan was sanctioned by the Governor, and I gave the necessary instructions; but after three months' delay it was discovered that the trifling sum necessary could not be provided.

The growth of the largest *Castilloa* tree at Henaratgoda is, at a yard from the ground, 30½ inches, an increase of 4½ inches during the year.

*Para Rubber*.—Nine trees flowered at Henaratgoda in March, and the fruit ripened in August. About two hundred and sixty seedling plants were raised, many of which have been disposed of to persons desirous to try the cultivation. Our largest tree is now 30 inches in circumference, an increase of 4½ inches in the year.

Eighteen plants of another species of *Hevea*, *H. Spruceana*, were received from Kew in October. This is a native of British Guiana, where it is generally known by its Arawack name "Hatie." It has been studied in its native forests by Mr. Jenman, who sent us a plant in 1881, which unfortunately died. Dr. Spruce also collected it on the Amazons. It is closely allied to *H. brasiliensis*, and grows under quite similar conditions. The specimen of the rubber sent home by Mr. Jenman for report appears to have been unfortunately mixed with some impurity which prevented its value being accurately ascertained. The plants have been put out mostly at Henaratgoda, and are doing well.

Some seeds of this species were also kindly sent to the garden by the Manager of the Ceylon Company, Limited, in July, but were quite dead. It is useless to attempt to import seeds of this description from any distance, as they lose their vitality in a few days.

*Other Rubber Plants*.—*Landolphia Petersiana*, one of the East African rubbers, has flowered during the year, and *L. Kirkii* is now in bud at Henaratgoda. Two plants of *Tabernaemontana crassa* are now doing well. Among seeds received from Mr. L. Wray, of Perak, were some of "Gutta Singret," which appears from leaf specimens, also sent, to be a species of *Chilocarpus*, another climbing apocynaceous genus. Its rubber is not of a good quality, and is chiefly used for adulteration. A few plants were raised and are planted at Henaratgoda.

*Gutta Percha*.—A valuable series of dried herbarium specimens, of wood,

and of the commercial products of the various gutta-producing trees of Perak, has been sent by Mr. L. Wray, Jr. (collecting for Sir H. Low), which has enabled me to determine with more certainty the species we possess is a living state. He has also sent me a copy of a report to Sir H. Low on the gutta question, which contains some valuable additional matter to that collected at Kew and published in the report of that institution for 1881, pp. 38-47.

I am now satisfied that the identification of "Gutta Sundek" with *Payena* (*Ceratephorus*) *Lecrui*, on which doubt has been thrown, is correct. Mr. Wray describes the tree as partial to swampy places near the coast, even where the water is salt; the wood is hard and close-grained, and the fruit sweet and eaten by the Malays. There is an inferior variety, with a thinner bark, known by its longer leaves. Our plants at Henaratgoda have grown quickly; their rate of growth is much more rapid than the species of *Dichopsis*—the largest are over 8 feet high; the tallest at Pérade-niya is 6 feet 2 inches.

The young plants of "Gutta Taban putih" grow very slowly. The good dried specimens now sent show this to be distinct from *Dichopsis Gutta*, but I am not able to say to which species of *Dichopsis* they should be referred. This tree is found in the lower hills, 1,800 to 2,500 feet, and not in the plains; the gutta is a dirty white (whence the name putih = white), coagulates slowly, and does not thoroughly soften even in boiling water. Mr. Wray also distinguishes a small-leaved variety with a longer fruit.

The specimens further confirm our previous knowledge that the best and most frequent sort of gutta percha of commerce, "Gutta Taban merah," is the produce of *Dichopsis Gutta*. Our trees of this are now nine years old, but the tallest is but 9 feet high. According to Mr. Wray, this tree attains 100 to 200 feet in height, with a clean, straight trunk of 4 to 5 feet diameter, flanked at the base with large thin buttresses; the bark is  $\frac{1}{2}$  to  $\frac{1}{2}$  an inch thick, brown-red in color, and flakes off; the leaves are much narrower on young plants than old ones, the flowers are white, and the seeds yield an oil, solid at ordinary temperatures, but used for cooking. The gutta is at first white and cream-like, but becomes pink, and ultimately brownish red ("merah" = red), and this color is strongly imparted to the water in which it is washed. There is a variety of this species affording a paler gutta called "Gutta Taban sutra" ("sutra" = silk), which is found at a higher elevation (500 to 600 feet).

Other sapotaceous trees affording gutta, of which specimens have been sent by Mr. Wray, are "Gutta Taban simpoo," *Dichopsis Maingayi*, Clarke—the product of which is also sold as "gutta putih"—and "gutta garru," *Bassia Mottleyana*, De Vriese, which gives a white hard sort, only used for mixing with other kinds. He also sends examples of the curious substance called "Gutta Jelutong," used for adulterating gutta percha. It is obtained from a very lofty apocynaceous tree allied to our "Rukattana" (*Alstonia scholaris*),<sup>1</sup> and recently named *Dyera costulata* by Sir J. Hooker.

The yield of the gutta percha trees seems to be very small—less even than

<sup>1</sup> This appears to yield a somewhat similar substance at Singapore, called Gutta Pulei.



the rubber trees. Thus from a tree of *D. Gutta*, thought to be over one hundred years old, and over 100 feet high, Mr. Wray succeeded in extracting, by the ordinary native method, of felling and ringing the trunk and branches, only 2 lbs. 5 ozs. of clean gutta. Of "*Gutta Taban putih*," a tree 10 inches in diameter, gave 2 lbs. 11 ozs., and one of *Payena Leerii*, 2 feet 8 inches in circumference, only 6½ ozs. Mr. Wray has satisfied himself that only about  $\frac{1}{38}$  part of the gutta percha actually in the bark is extracted by this method, and he believes that by pounding and boiling the bark the whole could be obtained. As the question of the supply of gutta percha is becoming a pressing one, it is to be hoped that experiments on a large scale may confirm this opinion. To quote Sir J. Hooker ("Kew Report, 1881, p. 38), "the time cannot be far distant when the natural sources of gutta percha will be definitely used up." In view of this contingency it behoves the governments of those few British colonies—Ceylon being one—in which the trees will grow, to lose no time in establishing plantations, which must in the future become a valuable source of revenue. But in this colony, neither in this case nor in the case of india rubber, can anything be done until a proper forest conservancy is established.—*Phar. Jour. and Trans*, June 28, 1884, p. 1052.

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## MINUTES OF THE COLLEGE.

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PHILADELPHIA, June 30, 1884.

The regular stated meeting of the Philadelphia College of Pharmacy was held this day at the College building, No. 145 North Tenth Street. Vice-President Charles Bullock in the chair. Thirteen members in attendance.

The minutes of the annual meeting in March last were read, and on motion adopted.

The minutes of the Board of Trustees for April, May and June were read by Thomas S. Wiegand, and on motion approved.

The Committee appointed at the last meeting to endeavor to prevail on those members who were reported by the Treasurer to be in arrears to pay up their dues, not being ready to report, was continued.

Mr. Pile, Chairman of the delegation appointed to attend the annual meeting of the Pennsylvania Pharmaceutical Association held in Wilkesbarre, Pa., made the following report:

The delegates chosen to attend the meetings of the Pennsylvania Pharmaceutical Association would respectfully offer the following report: The Association held its annual meeting at Wilkesbarre, on June 3 and 4, which proved to be one of the most entertaining and profitable that has been convened since its organization. The Association was welcomed by the Mayor of the city, Mr. Bodrick, who extended a cordial invitation to the members to visit the coal mines and other places of interest in the vicinity. President Duple delivered a very interesting address, after which the several reports of officers and committees were read. An election for officers to serve for the ensuing term was then held, and the following gentlemen



were declared elected: President, Chas. H. Cressler, Chambersburg; first Vice-President, Chas. T. George, M. D., Harrisburg; second Vice-President, Lawrence Wolff, M. D., Philadelphia; Treasurer, Jos. L. Lemberger, Lebanon; Secretary, J. A. Miller, M. D., Harrisburg. After the usual routine of business had been disposed of, the reading of answers to queries occupied the remainder of the several sessions, and all present were highly gratified at the remarkable success that attended the efforts of the Committee on Queries, whose Chairman, Mr. Alonzo Robbins, deserves great credit for his activity and perseverance in procuring so large a number of contributors. As many as twenty-eight papers were read and discussed, great interest being manifested in this part of the proceedings, the discussions at times being quite animated and instructive. Over eighty new members were proposed and elected, making a present membership of five hundred and three. Philadelphia and Erie were proposed as the place for the next meeting, and after some debate it was agreed to meet at Erie on the first Tuesday of June, 1885. The members were well entertained by the resident druggists and the Committee on Entertainments, and Mr. Kline, the chairman, is to be congratulated for the success of his efforts, which were highly appreciated by all who partook of the good things offered. A drive in carriages down the beautiful Wyoming Valley to the monument erected in memory of the soldiers who were massacred by the Indians in the early colonial days, a concert and a ball, and last and best, a magnificent excursion on a gravity road over the mountains to Jones' Lake. These all added greatly to most enjoyable gathering of the Pharmacists of our great commonwealth.

All of which is respectfully submitted.

GUSTAVUS PILE, *Chairman.*

In response to the resolutions of the College, forwarded to the American Association for the Advancement of Science, the following letter was received.

June 26, 1884.

*To the Philadelphia College of Pharmacy:*

GENTLEMEN:—At a meeting of the Committee on Invitations and Receptions, held last Tuesday, June 24, the Hon. John Welsh laid before it your generous invitation to the scientific men who will participate in the meeting of the American Association next September. I am directed by the Committee on behalf of the local committee to express to the Philadelphia College of Pharmacy its sincere thanks for this courtesy to our foreign and American guests, and to say that your invitation will be officially presented to them at the earliest possible moment.

I have the honor to be,

Very respectfully,

PERSIFOR FRAZER.

TO MR. WM. J. JENKS,

*Secretary Philadelphia College of Pharmacy.*

The resignation of Henry Fisher as a member of the College was read, and on motion accepted.

The following members were elected delegates to the annual meeting of the American Pharmaceutical Association, which will meet in Milwaukee, Wisconsin, on Tuesday, August 26, 1884, with power to fill all vacancies which may occur in the delegation, viz.: Messrs. Alonzo Robbins, Philadelphia, Pa.; Chas. A. Heinitsh, Lancaster, Pa.; Geo. W. Kennedy, Pottsville, Pa.; Gustavus Pile, Philadelphia, Pa.; Prof. Joseph P. Remington, Philadelphia, Pa.

Then on motion adjourned.

WM. J. JENKS, *Secretary*.

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## EDITORIAL DEPARTMENT.

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STATHMETIC ESTIMATION.—Mr. Alfred B. Taylor has called our attention to his article bearing the above title, as published in the Proceedings of the American Pharmaceutical Association, in which a sentence has been so changed by an omission, as to give an exactly opposite meaning to what was intended. On referring to the manuscript we observed that the mistake occurred by the compositor skipping one line. The sentence, which refers to "volumetric analysis," is printed on page 394 of the Proceedings, and should read as follows, by inserting the words printed in Italics: "The name does not appear to be exactly a proper one, since the process is used not for the purpose of ascertaining *the ingredients of a compound*, but *simply to determine* the quantity of some ingredient already known."

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THE S. D. GROSS PROFESSORSHIP OF PATHOLOGICAL ANATOMY.—A movement has been inaugurated with the view of perpetuating with medical education the name of the eminent American surgeon who recently passed away, and a committee has been formed in Philadelphia, and an auxiliary committee by physicians and surgeons residing abroad, as well as in the different States of the Union. The following circular explains the object in view:

American Surgery has had no better exponent than Samuel D. Gross; none so honored abroad and at home by institutions of learning; none more revered by his associates and his pupils. His long and brilliant professorial career deserves the perpetuation of his name in close association with medical tuition.

In furtherance of this object, the Alumni Association of Jefferson Medical College has inaugurated a movement to secure, in some medical school, the endowment of a Memorial Professorship, to be designated "The S. D. Gross Professorship of Pathological Anatomy."

The profession at large, the personal friends of the late Professor Gross, and others interested in elevating the standard of medical education, are cordially invited by the undersigned to participate in this graceful recognition of conduct and services which have largely helped to establish the high standard of excellence to which Surgery has attained throughout the United States, and served so much to dignify the repute of American Medicine.

Contributions may be sent to Dr. R. J. Dauglison, Treasurer, Lock Box 1274, Philadelphia P. O., and will be acknowledged in the columns of the "Medical News" of Philadelphia.

D. HAYES AGNEW, M. D. *Chairman.*  
J. M. BARTON, M. D., *Secretary.*

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

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*A Dictionary of the Action of Heat upon certain Metallic Salts*, including an index to the principal literature upon the subject. Compiled and arranged by J. W. Baird, M.A., Ph.C. New York: Bermingham & Co. 1884.

This is a paper of about 70 pages which was contributed by Prof. Prescott to the "Journal of the American Chemical Society." The notes have been compiled from a large number of journals and standard works, involving very considerable labor, for the results of which those who may have occasion to consult the pamphlet, are indebted to the author and compiler.

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*The Electro-osteotome*, a new instrument for the performance of the operation of ostiotomy. By Dr. Milton J. Roberts, Professor in the New York Post-graduate Medical School, etc.

Reprint from the "Medical Record."

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## OBITUARY.

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WILLIAM WOOD STOCKTON, Ph.G., of Mount Holly, N. J., died at Huron, Dakota, April 23d, of nervous prostration, at the age of 30 years. He learned the drug business in Philadelphia with J. W. Smith, graduated from the Philadelphia College of Pharmacy in 1876, and at the time of his death had been engaged in business on his own account for about six months.

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FRANK CONRATH, Ph.G., M. D., a native of Hesse-Darmstadt, came to this country at the age of eleven years, learned the drug business in Milwaukee, graduated in Philadelphia in 1875, afterwards studied medicine in Chicago, and graduated from Rush Medical College in 1880. For nearly two years he continued his studies in Berlin, Vienna and Prague, and in 1882 located in Milwaukee, soon obtaining an extensive practice. Inflammation of the lungs, which turned into acute consumption, terminated his useful career on May 15th last, at the age of 33 years.

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JOHN S. GOODYEAR, Ph.G., a graduate of the class of 1837, died in Philadelphia, June 15th, aged 71 years. He was in business at Seventeenth and Pine streets upwards of 37 years.

# THE AMERICAN JOURNAL OF PHARMACY.

SEPTEMBER, 1884.

## PRECIPITATES IN FLUID EXTRACTS.<sup>1</sup>

BY J. U. LLOYD.

*Read at the thirty-second annual meeting of the American Pharmaceutical Association at Milwaukee, and communicated by the author.*

In our last paper (for a brief abstract see "Am. Jour. Phar.," 1883, p. 586) we were led to bring forward an experiment, wherein by evaporating a solution of a mixture of the salts, chloride of sodium and chloride of ammonium, a separation of these substances was effected—one (chloride of sodium) being deposited near the bottom of the evaporating dish; the other (chloride of ammonium) being mostly deposited at the surface of the liquid, or even above the surface line, by the familiar creeping process. The examination of these deposits demonstrated that the lower part of the lowest deposit was more than half chloride of sodium, while the upper deposit contained but two-thirds of one per cent. of

<sup>1</sup> *Query*.—"Is there any method whereby a solvent can be perfectly freed from a substance in solution, without evaporating the liquid, precipitating the dissolved matter in an insoluble form, or changing the liquid (as adding alcohol to water)?"

This question was addressed to several of our foremost scientists, and without any information being furnished as to another known method. In connection with this subject, it is proper to state that for many years it has been known that charcoal will separate certain organic matters from solution; and, according to the experiments of Mr. Witt (1856), it was shown that 22 per cent. of chloride of sodium was taken from a solution of that substance by filtration through 1½ feet of sand. These facts are related to the experiments which follow, and to which we can find none similar on record. Indeed, quotations from our acknowledged authorities show that the phenomenon herein brought forward has been generally overlooked. We will cite as follows:

FILTRATION.—"The mechanical separation of a liquid from the undissolved particles floating in it."—*Ure*.

"The separation of suspended matter is effected on the small scale for laboratory purposes by filtration through porous paper."—*Roscoe & Schorlemmer*.

"The mechanical separation of fluid from solid matters mixed with them. The pores of the paper permit the fluid to pass through; whilst the solid matter, being prevented, remains behind."—*Galloway*.



chloride of sodium. The question that presents itself is, can solutions of salts separate from each other after being mixed? In continuing this subject, we shall confine ourselves to a phase closely connected with the foregoing experiment. The experiments tabulated herein were made more than a year ago. If we had written this paper before passing to other experiments, doubtless we should have permitted ourselves to theorize more freely regarding the phenomenon than we care to do at present. As it is, we shall present the experiments, and endeavor to reserve our opinions concerning them for a future day.

It may strike some persons that the present paper is entirely irrelevant to the subject of percolation and precipitation; but if we are permitted to complete this subject, we think that it will be shown that it is intimately connected with certain features that have considerably troubled pharmacists and others.

An unanswered query, once accepted by one of our most prominent members, is directly interested, and the phenomenon presented herein must be considered before that query can be satisfactorily answered.

A process of percolation, suggested once, in which the menstruum was directed to be admitted at the bottom of the percolator, and permitted to escape at the top, is also concerned.

Perhaps the analytical chemist will find some food for consideration, as it does not seem unreasonable to suppose that the principle involved in this paper may be of practical value in the separation of certain bodies one from another. Then, too, it may be found advisable to forego the process of filtration, if possible, where accurate results are desired. However, after we have introduced the line of experiments, and the criticisms into which we have been drawn, these features will readily present themselves to those interested.

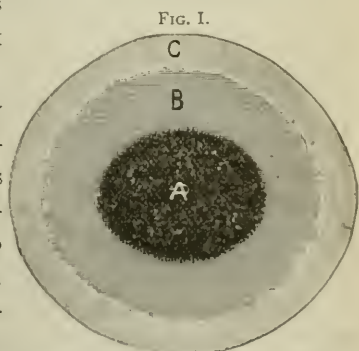
Let us now revert to the separation of the two salts by the evaporation of the water. The explanation that naturally presents itself is, that their separation resulted from the fact that the chloride of sodium crystallized, and left a mother liquor of chloride of ammonium. This afterward evaporated; and thus the salts were deposited in different locations. In order to test the correctness of the view, we were led to several series of experiments; and a section of one of these may be illustrated as follows.<sup>1</sup>

<sup>1</sup> We only give enough of the series to demonstrate the one feature to which this paper is devoted. Our investigations have extended far beyond the line drawn by this report, but we do not care to impose upon the society by introducing another step, as it would double the length of the paper.

Take an ordinary porous blotting-paper, and drop into its centre, drop after drop, some writing fluid. The spot will spread, but it will not present the same appearance from the center outward. There is usually a dark center, and then a dark line of demarkation, after which another shade appears, which, after spreading to a certain distance, will perhaps suddenly give place to a nearly colorless liquid. Continue to add the fluid slowly to the center of the blot, and the shades of color will expand and preserve their individuality, but the outer will usually grow more rapidly than the one immediately within. Sometimes several shades will be formed, but their individual characteristics will be maintained. If the ink be one of the purple or other colors of aniline, or a carmine, it will be generally found that the outer liquid will be colorless. The striking feature is the abrupt change from one shade to the other. It is not a gradual grading off, for a distinct line of demarkation usually separates each shade. We have introduced this experiment because it can be so readily performed, and because, upon second thought, every person must even now admit its familiarity. Mix two colors of ink, say red and blue, and try the experiment again. Very likely it will be observed that, under the same conditions, one color will leave the other after both have passed together for a certain distance, and leave it completely, and by a distinct line of demarkation. Then perhaps this second color will cease to spread, and a colorless liquid will pass out, and form a ring encircling the ink spot. (Fig. 1.)

These experiments may be easily made, and will illustrate the phenomenon; but since there are so many kinds of ink, it is impossible to predict a certain result. Therefore, to enter into the subject more systematically, we will bring forward the following experiment, in order to illustrate a natural phenomenon that we have not been able to find recorded in any work, and upon which those we have consulted can furnish us no information:

Dilute one part, by measure, of officinal solution of tersulphate of iron with thirty-two parts of water; then place a strip of blotting-paper, of loose texture, so that the lower end is immersed in the liquid.



A, dark purple. B, bright red. C, colorless.

A liquid is absorbed, and passes rapidly into the paper, reaching to a height of about half an inch at once. Then it ceases to extend upward as solution of tersulphate of iron, but not as a liquid.<sup>1</sup> A line of demarkation appears as distinct as though drawn by a pencil, and above this line a colorless solution passes; and this liquid is absolutely free from any salt of iron. If a piece of ferrocyanide of potassium be drawn over this paper, it refuses to strike a blue color until the dividing line is struck. Other reagents demonstrate conclusively the absence of even traces of iron above this line. (Fig. 2—for explanation see Fig.

3.) Here we have presented a reaction in which a substance in solution has separated from the solvent, without evaporation of the liquid, apparent precipitation of the solid in insoluble form, or change of solvent power of the liquid.

FIG. 11.



In considering this question from the experiment presented, a doubt must arise in our minds regarding the subject. Is it really a separation of a soluble iron salt from a solvent capable of dissolving it? This query naturally occurs when we notice that the upper edge of the iron solution, as it is absorbed by the paper, has a red color, which deepens as it passes upward, until finally the colorless liquid shoots above it. May it not be that an insoluble basic salt of iron is formed by oxidation of the iron, in the very thin layer of liquid? We thus questioned the matter, and found that the line of division formed as readily and the same in an atmosphere of carbonic acid gas. Again, a piece of paper from just beneath the line—indeed, the very edge of the line of division—when dipped into water, formed a solution that gave a deep blue color with solution of ferrocyanide of potassium.

This experiment, then, seemed to show that by means of an agency heretofore unrecognized in this manner, and which seems to be capillary attraction, a separation of solvent from substance dissolved can be effected, and absolutely. In analyzing the phenomenon, we find that there is not a gradual shading off of iron salt from below upward. It might seem natural to view the reaction as an absorption of the iron

<sup>1</sup>The texture of the paper influences the height to which the solution passes before the separation. The line of separation is soonest formed when the paper is porous. Very firm, compact paper will carry the entire solution to a considerable height. Common Swedish filter paper will answer, but not so well as blotting-paper.

by the fibers of the paper through which the liquid passed, until finally all the iron disappeared. Upon the contrary, it seemed to be a struggling upward of several liquids;<sup>1</sup> and when the so-called solution reaches a certain height, one part of it is attracted onward with greater force, and frees itself from the others. There appears to be an unequal attractive force between the fibers of the paper and the substances passing through them; there seems to be an unequal and independent capillary attraction between the fibers not moistened and the liquids in contact with them. These forces acting at the same time, cause a separation of solutions at a certain distance from the surface of the liquid; and after this separation is once effected, the liquid that has freed itself from the other, or others, seems to pass freely through it, or them, apparently drawn from above more rapidly than the other, or others can follow. Thus, although the lower part of the paper is saturated with mixed solutions,<sup>2</sup> the liquid that has separated itself seems to flow rapidly through the lower stratum and out of the line of demarkation, without a molecule of the iron salt accompanying it.<sup>3</sup>

In continuing the study of this phenomenon, we find that the proportion which the iron salt bears to the liquid influences the point at which the separation of the iron solution occurs. If the solution is dilute, the separation takes place just above the surface of the liquid in the vessel. As it increases in strength, the iron passes higher upon the paper, and with officinal syrupy solution of tersulphate of iron there will be no separation. (See Fig. 3.)

This fact leads to another point in connection with the subject, to wit: an attraction seemingly exists between the iron salt and the water, which is stronger in proportion to its concentration. Therefore, as the

<sup>1</sup> Solution of tersulphate of iron contains other substances besides the salt of iron. There are free acids, and they are not retained in accordance with the detention of the iron. The indications are also that the coloration of solution of ferrie sulphate is due to accompanying oxide or oxysulphate in soluble form, and that true ferrie sulphate has no red color.

<sup>2</sup> We admit that the term solutions is not in accordance with our present understanding of a solution of several salts in one menstruum. Authorities do not, we think, view them as distinct liquids mixed together and existing independently of each other, but rather as one solution. For the sake of illustrating these experiments, we shall speak of a solution of different bodies as being an association of separate solutions, each retaining its individuality.

<sup>3</sup> There is a gradual and uniform upward motion of all the liquids, however, although the lowest stratum in the paper moves slowest.



proportion is in favor of the iron, the water has less power to free itself and climb away.

Can it be, then, that capillary or surface attraction has the power to dissociate a solution? If so, it seems to us that this fact must have been overlooked in many instances where its consideration was a necessity to accuracy in results.

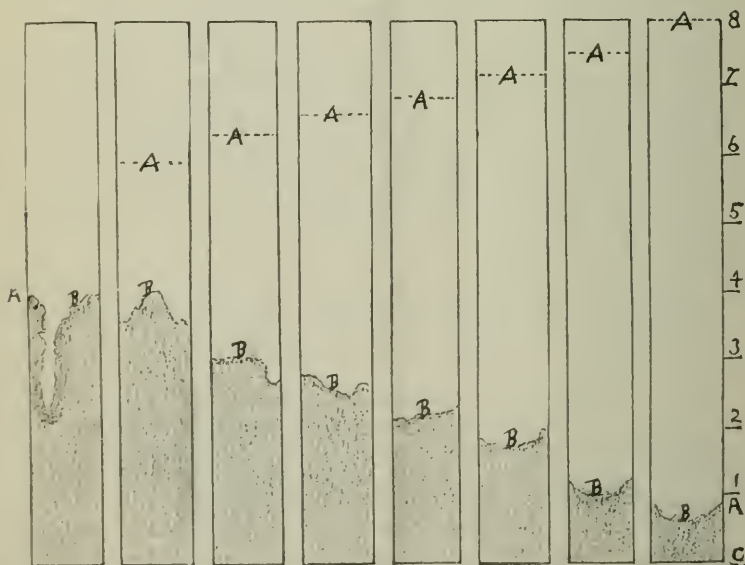
In looking at the phenomenon as presented in the foregoing portion of our paper, it will be seen that we may sum up the matter as follows:

1st. The bibulous paper absorbs and carries to a certain height the liquid about as it exists in the vessel.

2d. At a point above the surface of the liquid, determined by the texture of the paper and the concentration of the solution, the iron salt ceases to pass upward<sup>1</sup> as rapidly as the water or other substances held in solution by the water.

3d. Then the liquids separate, and the colorless liquid is actually

FIG. III.



A, colorless liquid. B, ferric sulphate. C, surface of liquid. The left hand figure is official solution of tersulphate of iron.

drawn (or thrust) through the solution of iron without carrying a trace of ferric sulphate beyond the line of division.

<sup>1</sup> We use the term upward to correspond with this line of experiments. The same phenomenon is presented when the paper is horizontal or inclined, if capillary attraction only carries the liquid outward.

In order to determine the amount of water thus passing through a liquid, we call attention to the following experiment:

A piece of blotting paper was placed with the lower end in a solution of ferric sulphate, made by mixing 1 part of officinal solution of tersulphate of iron with 32 parts of water. The separation occurred as previously described, and when the watery liquid reached the top of the paper (5 inches), the iron solution had ascended but 2 inches. The paper was then divided at the line of separation and at the surface of the liquid, the iron solution in the lower part was weighed with the paper, and the water and paper in the upper portion weighed. Each part was then dried, and weighed again.

RESULT.—Water in the part of the paper that contained iron, 7 parts.

Water in the paper above the line to which the iron had ascended,  $7\frac{1}{2}$  parts.

In the same way, one part of solution of tersulphate of iron (ferric sulphate) was mixed with sixty-four parts of water, and the portions of paper examined.

RESULT.—Water in the part of the paper that contained iron, 4 parts.

Water above the line to which the iron ascended,  $9\frac{1}{2}$  parts.

Thus it will be seen that in the first experiment the water that had separated was slightly greater than that remaining with the iron; while in the second experiment more than twice as much water escaped as remained with the iron.

We present also an experiment with acetate of lead, as follows:

Five grains of acetate of lead were dissolved in one fluidounce of water. The paper was immersed, and the dividing line ascertained by means of a crystal of iodide of potassium. Upon separating the paper, it was found that

The water in the part of paper that contained lead, amounted to  $8\frac{1}{2}$  parts.

Water in the paper above the line to which the lead ascended, amounted to  $4\frac{1}{2}$  parts.

In the same way, five grains of acetate of lead were dissolved in four fluidounces of water:

The water in the part of the paper that contained lead, amounted to  $5\frac{1}{2}$  parts.

Water in the paper above the line to which the lead ascended, amounted to  $13\frac{1}{2}$  parts.

All of these experiments uphold the principle that the weaker the solution the quicker the separation, and the larger the amount of the escaped water.

We have mentioned the fact that mixed colored inks separate from each other under the influence of the capillary attraction of bibulous paper. It is demonstrated that certain salts will also do this, and completely. In order to show that they act independently of each other when dissolved in a single solvent, we call attention to the following experiment:

Dissolve separately, each in one ounce of water, five grains of ferrous sulphate (and add one drop of sulphuric acid), five grains of cupric sulphate, and thirty minims of officinal solution of tersulphate of iron (ferric sulphate). Place a strip of bibulous paper upright in each, and it will be found that at a certain height the metallic solution is retarded. This can be readily shown by drawing a piece of red or yellow prussiate of potash down the paper, for the characteristic coloration will appear as soon as the reagent comes in contact with the salt. However, it will be found that they separate at different heights in the papers.



FIG. IV.

Now mix the solutions, and repeat the paper experiment. When the reagents are applied to the paper, it will be shown that the ferric sulphate extends only a certain distance; then a mixture of ferrous sulphate and cupric sulphate; then the ferrous sulphate alone; and finally a colorless solution passes onward, perfectly free from either salt. (Fig. 4—for explanation see Fig. 5.)

The boundary line between each salt is clear and sharp.

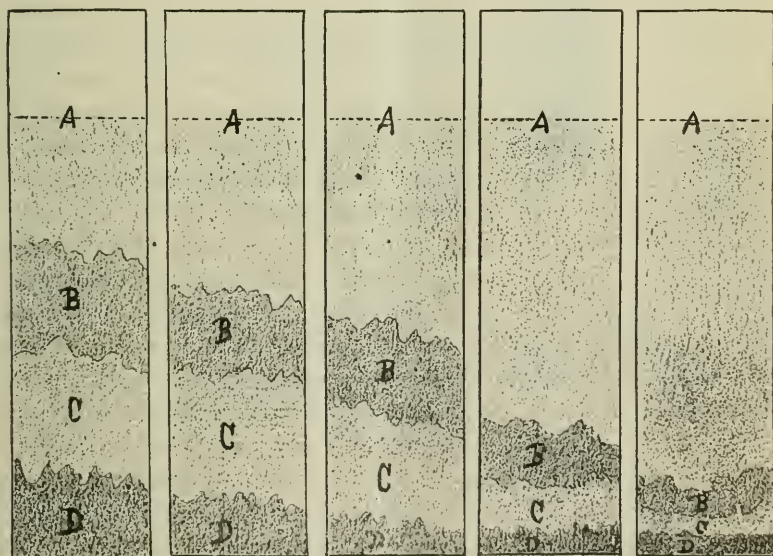
Upon diluting this mixture with its bulk of water, the rule of the diluted ferric sulphate (Fig. 3) is found to be maintained; and, by repeated dilution of each succeeding solution with its bulk of water, a series of regular demarkations are obtained, as shown by Fig. 5.

In the same manner solutions of certain alkaloidal salts can be separated from each other, as, for example, sulphate of quinine and sulphate of berberine, the quinine salt passing onward and leaving the berberine.<sup>1</sup>

<sup>1</sup> It is not unreasonable to suppose that advantage may be taken of this principle to separate certain bodies that seem to dissolve and precipitate alike. Indeed, we have used it in separating uncrystallizable coloring matters from crystals of organic bodies, where simply the close wrapping of two or three layers of blotting paper over the moist magma will remove the coloring material as the mass dries out.

In carrying this series of experiments further, it is readily shown that not only can we separate liquids from each other within the paper, but we can separate them as liquids by acknowledging the fact that a liquid tends to flow from a tube, capillary or otherwise, if the extremity is beneath the surface of the liquid in the container. Two test-tubes were placed beside each other, and into one an inch of solution of ferric sulphate (the strength before named) was poured. A strip of blotting-paper was then so placed that one end reached into the liquid, while the other end rested below it in the other vial. The paper was curved so that the height was four inches; therefore the liquid traversed eight inches. The exposed part of the paper was covered by means of a sheet of rubber, in order to retard evaporation. (See Fig. 6.)

FIG. V.



A, height of colorless liquid. B, height to which the ferrous sulphate is carried. C, height to which the sulphate of copper is carried. D, height to which the ferric sulphate is carried.

In twenty-four hours a layer of colorless liquid was carried into the empty vial, and this liquid refused to show a trace of iron by the usual reagents.

Therefore, to sum up from the view presented by these experiments:

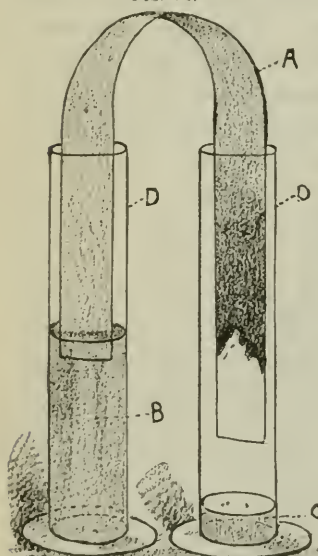
*The solvent can be perfectly separated from dissolved matter by what appears to be simply capillary attraction.*



We must not, however, infer that this is evidence that such a rule will be carried out with other bodies. Experiments with many salts and other substances agreed, but some refused to separate, chloride of sodium being carried to a height of six feet.

We do not design in this paper to enter into a theoretical argument regarding the causes for the phenomenon herein presented. We aim simply to present the facts, and, in so doing, must consider briefly cer-

FIG. VI.



A, blotting paper. B, solution ferric sulphate. C, transmitted liquid. D, ferric sulphate in paper.

tain objections that have occurred to us regarding the idea that real solutions can be separated from each other by means of the capillary or surface attraction of materials that have no recognized chemical affinity for either of the constituents. Therefore, as the substances that we have named are all solids, it might perhaps be inferred that the molecules of these solids are held in the minute interstices of the paper, while the more mobile fluid escapes.<sup>1</sup> Such a view could scarcely be sustained, because mixtures of *liquids* may be separated from each other—indeed, even though such a mixture is supposed to have combined chemically. Sulphuric acid and water are accepted as having rather an intense affinity, and their union is broken only by a considerable display of energy. The mixture of sulphuric acid and

water is as perfectly disintegrated by the bibulous paper as were the other substances named by us. This can be shown by making a dilute solution of sulphuric acid in water, and allowing it to pass up the paper, and then pressing a piece of blue litmus paper upon the surface of the part of the bibulous paper that is moistened. The litmus will change to red for a certain distance, defined by a line of demarkation as distinct as that shown by the iron salt.

The facts, then, to be presented in this paper are, that—

1st. Liquids can be separated from solids held in solution, without

<sup>1</sup> It must be admitted that such a view is not in accordance with our idea of a solution.

evaporating the liquid or precipitating the solid in an insoluble condition.

2d. Liquids can be separated from each other.

3d. Certain chemical combinations even can be broken without calling upon such recognized dissociating powers as high or low temperature, or the action of reagents.

This dissociating force has been overlooked in many places where, perhaps, it might have been useful. It may have been an unknown factor in leading to discrepancies in delicate analytical work that involved frequent filtration. There are other points of interest that we hope to consider in the future.

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## CIMICIFUGA RACEMOSA.

BY MILTON S. FALCK, PH.G.

*From an Inaugural Essay.*

*Description.*—The rhizome is (25 mm.—15 cm.) 1 to 6 inches or more in length, and from (5–25 mm.)  $\frac{1}{3}$  to 1 inch in thickness, horizontal, rather hard, after drying brownish-black externally, yellowish-white internally, with stout upright or curved branches. These branches are annulated and slightly wrinkled, and are marked above by cup-shaped scars left by the decay of the overground stems of previous years. Attached to the lower side of the rhizomes are numerous brittle, irregularly rounded, wiry rootlets, about (3 mm.)  $\frac{1}{8}$  inch thick, or less, of a blackish-brown color externally, white internally, and longitudinally wrinkled. The drug has a rather heavy disagreeable odor when fresh, but is nearly inodorous when dried. The taste (at first mucilaginous) becomes persistently bitter and acrid. The drug when dry and old has these qualities less evident, which point to the fact that it is less active than when recently dried, or when in a fresh state, and this is fully carried out by the more satisfactory results obtained by the administration of the latter as remedial agents. It should be collected in the latter part of August and early part of September, as at this time of the year the drug is most fully developed. The odor and taste of the rootlets resemble that of the rhizome. As met with in commerce, the rootlets and often the rhizomes are much broken, and quite frequently the former are altogether wanting.

*Histology.*—The rhizome breaks with a smooth fracture, and

exhibits upon a transverse section a large central pith made up of about twenty-one rows of colorless, thin-walled, parenchymatous cells. Surrounding this central cell-structure is a circle of wood-tissue, about as wide as the pith, consisting of flattened prosenchymatous cells smaller than the cells of the pith and circularly arranged in more or less distinctly wedge-shaped masses, and, of large thicker walled cells, which upon examining a longitudinal section proved to be pitted ducts. The woody-tissue has about thirty to forty medullary rays radiating through it from the pith to the bark. These rays are made up of ten to twelve rows of elongated parenchymatous cells and two to three rows of pitted ducts. The pleurenchymatous tissue is separated from the prosenchymatous tissue of the bark by a cambium layer made up of a single row of rectangular-shaped cells about one-fourth the size of the surrounding cell-structure. The bark is made up of two layers. The outer bark consists of three to five rows of loose thin walled parenchyma, containing a yellowish-brown coloring matter. The inner bark consists of about thirty rows of horizontally flattened prosenchymatous cells larger than the cells of the woody tissue or pith.

The rootlets have a short, smooth fracture; and upon a transverse section show an outer and inner bark, a cambium layer, and a medullium. The outer bark consists of one to two rows of parenchymatous cells loosely placed together containing a brownish coloring matter. The inner bark consists of ten to twelve circular rows of flattened prosenchymatous cells. The bark is separated from the medullium by a cambium layer of a single line of rectangular cells smaller than the surrounding tissues. The medullium is made up of complete parenchymatous cells, with lighter colored rectangular pleurenchyma tissue radiating through it in a triangular, cross-like or stellate manner according to the number of wood-bundles. Around the outer sides of the medullium and at the ends of the wood-rays the parenchyma tissue is crowded in dense masses and elongated, as if pushed out of place by the wood-bundles. The arrangement of the woody tissue in the rootlets, representing a maltese cross, is the characteristic distinguishing mark of the drug.

*Medical History.*—The early history of this drug, and the time when it was first used as a remedial agent to the human race is not known. Considerable variance of opinion has existed with regard to the influence this drug is capable of exciting upon the animal economy.

Linnæus, in his *Materia Medica* published in 1771, called it *Actœa*

*racemosa*, and classed it among the sudorifics and anodynes. The first mention of the drug by the profession was made by Benjamin Smith Barton in his *Collections for an Essay towards a Materia Medica of the United States*, in which he says: "The *Actæa racemosa* or Black Snakeroot, is also a valuable medicine. The root of the plant is considered astringent. In a putrid sore-throat which prevailed in Jersey, many years ago, a strong decoction of the root was used as a gargle with great success. The Indians called it squaw-root, and set an high value on it as a medicine. A decoction cures the itch."

The author then notes from various journals and standard works the observations and recommendations by Drs. Garden, of Wyliesburg, Va., (1823), C. C. Hildreth, Chapman (1831), Jesse Young, Davis, Physicks, Wood and many others, and afterward discusses the introduction of the drug into the United States Pharmacopœia and the various preparations made from it since 1860.

*Chemical Analysis.*—Two portions, 5 grams each of the fresh rhizome and rootlets were dried: one spontaneously, the other in a desiccator. That portion dried spontaneously lost 52.5 per cent., that in the desiccator 54.5 per cent. of moisture. One gram of the powdered air-dried drug at 100° C. lost 7.8 per cent. of moisture. This upon being incinerated at a low heat, yielded 6.8 per cent. of a grayish-white ash; of this ash, 1.3 per cent. was soluble in water, consisting of potassium and sodium as chlorides and sulphates; 3.6 per cent. soluble in hydrochloric acid, consisting of calcium, iron, and magnesium as carbonates and phosphates; 4 per cent. soluble in sodium hydrate, consisting of combined silica, and 1.5 was insoluble in water, hydrochloric acid and sodium hydrate.

An infusion of the drug upon evaporating and cooling became slightly gelatinous. The infusion yielded, precipitates with nitric acid, copper sulphate, lead acetate, silver nitrate, mercuric chloride, ammonium moxalate and gelatin; it became blue with iodine and reduced Trommer's solution.

The percolate, made with cold water, was of a yellowish-brown color, at first clear, soon became cloudy and upon evaporating yielded 23.5 per cent. of a brownish-black extract. The alcoholic percolate was of a clear golden yellow color, and upon evaporating yielded 12.5 per cent. of uniform yellowish-brown extract.

Wax was found in small quantities, by treating the resin exhausted by alcohol, with chloroform. Resin was obtained by exhausting the



drug with alcohol, evaporating and pouring the concentrated tincture into water, collecting the precipitate washing and drying. The resin had a brownish-yellow color, was without odor, but had a slight taste, was soluble in alcohol, ether and chloroform, partly soluble in cold and hot solutions of potassa, and insoluble in benzin, hot and cold water. After treatment with animal charcoal the resin was of a yellowish-green color, and when incinerated left a grayish-white ash.

The distillate obtained by cohobation from 26 pounds of the fresh drug, was milky and had the odor of the drug, but no separation of volatile oil occurred, though the top of the bottle which contained the distillate, appeared greasy when the water was shaken. Portions of this distillate were then agitated with ether, chloroform and deodorized benzin, and set aside. After twenty-four hours that agitated with benzin had a whitish snow-like substance floating upon the top, while that which had been agitated with chloroform had separated the substance at the bottom of the vessel, and no similar separation was observed in the portion of the distillate agitated with ether.

The floating mass, collected from the distillate agitated with benzin, appeared like minute globules, and after freeing it as much as possible from benzin and water, and evaporating it to dryness, the residue weighed .025 grams and was a fine grayish-white powder without odor or taste, soluble in alcohol, slightly soluble in benzin, benzol and stronger ether, insoluble in water.

Ten pounds (avoir.) of the fresh drug was placed in an hydraulic press (power 4,000 pounds to the square inch). From this pressure there resulted one pint and a half of dirty-brown colored liquid, which after filtering was blackish-brown, and on evaporating yielded 4.252 grams of brownish-black extract. Treated in the manner stated by T. E. Conard, "Am. Jour. Phar., 1871, p. 152," the crystalline substance described by him, was obtained, the properties of which differed in the following particulars: It was insoluble in hydrochloric acid, but soluble in sulphuric and dilute sulphuric acids. Strong sulphuric acid, when in contact with it for a little time, gave it a brown color, which upon the addition of a few drops of solution of bichromate of potassium was changed to a permanent yellow. An alcoholic solution was neutral, or if anything slightly alkaline to test paper, and when concentrated and poured into water gave a white precipitate which was insoluble in the alkalies. The fumes from the substance when fused with pure potassa, in a test tube, colored red litmus-paper

blue, and gave rise to white fumes when a rod moistened with hydrochloric acid was passed partly into and over the top of the tube. The substance fuses at a moderate heat, and is entirely dissipated at a red heat. A precipitate was obtained when a solution of the substance in alcohol was treated with an alcoholic solution of chloride of gold and sodium, also when an acid solution was treated with an aqueous solution of chloride of gold and sodium. An acid solution when treated with phosphomolybdic acid gave a precipitate. An acid solution (the acid solutions all made with dilute sulphuric acid) gave with solution of iodo-hydrargyrate of potassium a precipitate. A precipitate was gotten from an alcoholic solution by adding an aqueous solution of tannin, care must be taken not to add sufficient to get a precipitate with water in the test solution. From the above tests and the examination with the microscope which I have made of this substance, isolated from *cimicifuga racemosa*, I judge it to be an alkaloid.

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## SANICULA MARILANDICA, LINNÉ.

BY CALVIN JEROME HOUCK, PH.G.

*From an Inaugural Essay.*

This species, which is known in the neighborhood of Lebanon, Pa., by the name of Black Sanicle Root, or Pool Root, is a perennial plant growing to the height of about two feet. The stem is slender, finely grooved, and dichotomously branched above. The stem-leaves are 5-7 parted, the divisions ranging in shape from obovate to lanceolate, and being doubly serrate. The flowers (some of which are sterile) are arranged in nearly simple umbels. The fertile flowers are sessile, and produce a round orthospermous cremocarp which is covered with prickles. The plant grows in abundance in the interior of Pennsylvania, in shady and rocky woods, and flowers in June or July. The root which is the part employed, is short and thick, with many rootlets, has a slight odor when fresh, which becomes more persistent by long keeping, and is light brown in color, but becomes black after drying. It is collected during the month of August, and loses one-fourth (?) of its weight by drying. When boiled the bark is detached exposing the thin white inner root. The root when chewed is strongly

acid, and pungent, and quite aromatic, but leaves a very unpleasant sickening sensation on the tongue and paucies, remaining for a long time. It is an expectorant, diaphoretic; sometimes used in intermittent fever, also in chorea. In the interior of Pennsylvania, it is extensively used in domestic practice for pulmonary affections, with satisfactory results.

Owing to the oily nature of the root, an ethereal extract was first prepared from four ounces of the root in fine powder by exhausting it with ether; the extract was oily, resinous, very aromatic, dark in color, with a burning acid, and nauseous taste, insoluble in water, partly soluble in alcohol and chloroform. A portion of this extract dissolved in an alkaline solution, was precipitated by the addition of a small quantity of acid; upon drying this precipitate and subjecting it to a flame it burns emitting dense smoke.

Four ounces of the root in No. 40 powder, exhausted with dilute alcohol, yielded a soft extract weighing  $2\frac{1}{2}$  drachms; only slightly pungent, not very aromatic, but dark in color, containing only a slight trace of oil and no resin, but considerable coloring matter.

Eight ounces of the powdered root in (No. 50 powder) were exhausted, first with ether, then with alcohol, and lastly with dilute alcohol. The ethereal tincture had scarcely any color, but contained considerable oil and resin. The alcoholic tincture was of a pale straw color, and contained resin and extractive. The dilute alcoholic tincture was dark brown in color and contained tannin, extractive and coloring matters. These tinctures being evaporated to extracts and testing as before, gave results similar to those mentioned before.

The four ounces of root which had been exhausted by dilute alcohol alone, were boiled with water, giving a decoction which was dark brown in color, with but slight odor. By testing it was found to contain gum, starch, coloring matter and extractive.

One ounce of the root was carefully reduced to ashes, weighing 43 grains, and containing phosphate and carbonate of potassium, calcium, magnesium and iron.

The virtues of the root probably depend mainly on the volatile oil and resin; the alcoholic tincture seems to contain all the desirable constituents in solution.

## ANALYSIS OF MALT.

BY FRANK N. MOERK, PH.G.

*From an Inaugural Essay.*<sup>1</sup>

The malt used in this analysis was prepared from the barley of the previous analysis, and was eight days on the floor. It was reduced to a fine powder by grinding and using a mortar and pestle. The analysis, with the exception of the alcohol extract, was a repetition of the same operations described for barley (see "Amer. Jour. Phar.," 1884, p. 366).

*Moisture.*—Loss in drying 5 Gm., 0.528 Gm., or 10.56 per cent.

*Ash.*—Amount of ash in 5 Gm., 0.119 Gm., or 2.38 per cent. Of the 0.119 Gm., 0.046 Gm. was soluble in water, 0.045 Gm. in hydrochloric acid, 0.015 Gm. in solution of soda, and 0.013 Gm. was insoluble.

*Nitrogen Estimation.*—2 Gm. of malt evolved sufficient ammonia to replace 135.1 Cc. of the alkaline solution, or to neutralize 2.702 Cc. of the acid solution. By multiplying 2.702 by 0.014 Gm., for reasons already given, there is obtained 0.037828 Gm. nitrogen, and this product multiplied by 6.25 gives 0.23645 Gm., the amount of proteids in 2 Gm. malt, or 11.82 per cent.

*Benzin Extract.*—10 Gm. of powdered malt were treated with benzin until exhausted. The total extract amounted to 0.34 Gm. Of this, 0.026 Gm. was soluble in water (fatty and acid); 0.17 Gm. was soluble in alcohol (fatty and resinous); and 0.144 Gm. was insoluble in water or alcohol.

*Alcohol Extract, No. I.*—After drying the portion insoluble in benzin it was exhausted with 80 per cent. alcohol. The total extract was 1.533 Gm., of which about 0.22 Gm. consisted of a light brownish mass, soluble in water and alkalies; the solution of the substance in the latter was considerably darker in color. This darkening is also produced by long heating of the aqueous solution. The extract was carefully neutralized with an alcoholic solution of sodium hydrate, and evaporated to dryness on a water-bath. It was then extracted with boiling water, and diluted to 75 Cc. This solution reduced Fehling's

<sup>1</sup>The essay was accompanied by a number of samples of the different products obtained in the course of investigation.



solution. As the extract was made without heat, and neutralized before evaporating, the sugar detected could not have been produced from cane-sugar or dextrin.

O'Sullivan, about 12 years ago, rediscovered the fact that solutions of malt or diastase, in acting upon gelatinized starch, do not produce glucose, as was previously believed, but maltose, an isomer of cane-sugar. Maltose was first obtained by De Saussure, in 1819, but Dubrunfaut, in 1847, was the first one to recognize it as a distinct sugar. The sugar found in the above extract was regarded as maltose. This sugar has a reducing power two-thirds as large as that of glucose, thus requiring 0.075 Gm. to reduce 10 Cc. Fehling's solution. The amount found in the extract was 0.67 Gm.

After estimating the maltose, the remaining 50 Cc. of the solution were mixed with 3 Cc. hydrochloric acid and boiled for 2 hours. The acid was then neutralized and the liquid reduced to 75 Cc. The whole extract was capable of reducing 6.38 Gm.  $\text{HgI}_2$ , and Fehling's solution showed the presence of 1.2671 Gm. sugar.

In this case the following equations are gotten;  $x + y = 1.2671$  and  $4.79x + 6.71y = 6.38$ , showing, when calculated, that 0.162 Gm. invert-sugar, produced from 0.154 Gm. cane-sugar, and 1.105 Gm. glucose were contained in the extract after boiling with the acid. The maltose—0.67 Gm.—on boiling with acids is rapidly converted into glucose, and, as it is an isomer of cane-sugar, the change is effected in the same way:  $342 : 0.67 :: 360 : x = 0.705$  Gm. glucose produced from the maltose. This amount of glucose subtracted from 1.105 Gm. yields 0.4 Gm., which must have been produced from 0.36 Gm. dextrin.

No. II.—To ascertain if the sugars and dextrin were originally present in such a large proportion, or if they were formed during maceration, another alcohol—95 per cent.—extract was made from 20 Gm. malt after the fat, etc., had been removed by benzin. This extract was treated as the previous one, with the sole exception of diluting to 75 Cc. instead of 150 Cc. This solution tested for maltose showed the presence of only 0.304 Gm. The remainder of the solution, after boiling with acid and neutralizing, was again tested. The whole extract contained 0.6446 Gm. sugar, and reduced 3.71 Gm.  $\text{HgI}_2$ .

$x + y = 0.6446$  and  $4.79x + 6.71y = 3.71$ . When these equations are calculated,  $x$  or glucose equals 0.3204 Gm. and  $y$  or invert-

sugar equals 0.3241 Gm. The 0.3204 Gm. glucose is produced from 0.304 Gm. maltose, and the 0.3241 Gm. invert-sugar from 0.308 Gm. cane-sugar.

*No. III.*—There being such a large difference in the amount of maltose in the two extracts, another extract was made from 20 Gm. malt, with dilute alcohol containing 2 per cent. salicylic acid. This acid was used successfully by Brown and Heron to arrest the action of diastase. This extract was made by macerating the malt with three successive portions of the menstruum of 50 Cc. each. Alcohol was added after the last percolate to remove all of the salicylic acid. The percolate was neutralized with potassium hydrate, evaporated to dryness, and the residue extracted with hot water and diluted to make 75 Cc.

When tested for maltose, the same quantity was found as in *No. II*—0.304 Gm. The remainder of the solution, treated with acid as in *No. II*, showed the presence of 0.9485 Gm. sugar in the whole quantity, while it reduced 5.165 Gm.  $\text{HgI}_2$ . The sugar, 0.9485 Gm., consisted of 0.324 Gm. invert-sugar from 0.308 Gm. cane-sugar, and 0.6246 Gm. glucose. Of this, 0.32 Gm. glucose was produced from 0.304 Gm. maltose, leaving 0.3046 Gm. glucose produced from 0.274 Gm. dextrin.

The results of the extracts are summed up as follows:

	Cane-sugar.	Maltose.	Dextrin.
No. I.....	1.54 per cent.	6.7 per cent.	.....
No. II.....	1.54 “	1.52 “	.....
No. III .....	1.54 “	1.52 “	1.37 per cent.

*Cold Water Extract.*—To make this extract, the undissolved portion remaining from the last alcoholic extract was taken and macerated, and percolated with water until the percolate ceased to leave a residue on evaporation. The percolate was concentrated to 40 Cc. and tested for sugar, but this was shown to be absent.

After boiling it with dilute sulphuric acid for two hours, neutralizing with sodium carbonate, and again testing for sugar, glucose was present to the extent of 0.4754 Gm., reducing 2.2804 Gm.  $\text{HgI}_2$ , formed from 0.428 Gm. dextrin.

The insoluble parts of the malt were dried, and weighed 14.932 Gm.—from 20 Gm. malt.

*Acid Extract.*—These 14.932 Gm. were boiled with 10 Cc. sulphu-

ric acid and 400 Cc. water for 8 hours. It was then proceeded with as the acid extract under barley. The amount of sugar found was 12.346 Gm., and consisted only of glucose, reducing 59.221 Gm.  $\text{HgI}_2$ . This glucose was produced from 11.112 Gm. starch. The insoluble portion weighed 3.58 Gm. and the extract 11.352 Gm., of which 0.24 Gm. was not starch.

*Alkali Extract.*—The remnants of the malt, 3.58 Gm., were boiled with 200 Cc. of a 20 per cent. solution of sodium hydrate, filtered and washed thoroughly. The insoluble parts when dried weighed 1.596 Gm. The extract, weighing 1.984 Gm., consisted of proteids and ash.

The crude cellulose and ash, 1.596 Gm., was macerated for 24 hours in a solution of chlorinated soda, then thoroughly washed and dried. Weight, 1.59 Gm.

The amount of ash was found to be 0.046 Gm., leaving 1.544 Gm. as the amount of pure cellulose in 20 Gm. malt.

To sum up the results of the different operations, the results from the alcoholic extract to the pure cellulose were divided by 2, so as to represent 10 Gm. of malt.

The following is the percentage composition :

		Calculated as free from moisture.
Moisture.....	10.56	.....
Ash.....	2.38	2.66
Proteids.....	11.82	13.21
Fat, Resin, etc.....	5.60	6.26
Cane-sugar.....	1.54	1.72
Maltose.....	1.52	1.70
Dextrin.....	3.51	3.92
Starch.....	55.56	62.12
Cellulose.....	7.72	8.63

*Examination of Samples.*—These samples were prepared for the object of finding out the increase of diastase at certain stages of the malting process.

After numerous experiments on the action of diastase upon gelatinized starch, the idea had to be abandoned for the reason that diastase, no matter how carefully prepared, could not compare in its action on

gelatinized starch with the equivalent amount of malt, and therefore no basis for working could be made. The object was then changed to estimating the amount of maltose and dextrin present in the wort prepared from them.

The samples, of which there were twelve prepared from the same barley, were obtained as follows: One from the barley, one from the steep, one from the couch, one for every twenty-four hours the grain was on the floor, and, lastly, the kiln-dried or finished malt. Of these, the barley and the malt were used in the analysis.

The moisture was determined by drying 5 Gm. until of a constant weight at a temperature of 110°C., or 230°F. Draff constitutes the insoluble portion, and is estimated by collecting on a weighed filter, and drying at 230°F.

*Maltose.*—20 Gm. of the sample were ground and mixed with 100 Cc. water, at 60°F., and gradually heated in one-half hour to 140°F. It was allowed to remain at this temperature for one-half hour, and then in 15 minutes raised to 167°F., and kept there for another half hour. At the end of this time it was slowly heated to the boiling point, the whole process requiring two hours. The wort, as this is called, was allowed to cool, filtered, and sufficient water passed through the filter to make the filtrate weigh 200 Gm. The *specific gravity* of this was taken at 60°F. The amount of maltose in the solution having been approximately estimated, a portion of the wort is diluted so as to contain about 1 per cent. maltose, and the amount estimated in the whole solution. It has been shown that solutions of maltose or glucose containing less than  $\frac{1}{2}$  per cent. or more than  $1\frac{1}{2}$  per cent. do not reduce Fehling's solution in the same proportion as solutions containing amounts between the above.

*Dextrin* is estimated by boiling 25 Gm. of the wort with 75 Gm. water and 3 Cc. sulphuric acid for 2 hours. The amount of glucose found in this portion multiplied by 8 gives the amount of glucose producible from the wort. From this must be subtracted the amount formed from the maltose, giving as the difference the quantity produced from dextrin, which multiplied by .9 equals the amount of dextrin. This is slightly inaccurate, as no allowance was made for the amount of invert-sugar produced from the cane-sugar, 1 to  $1\frac{1}{2}$  per cent.

The result from barley is wanting, as the wort was so mucilaginous that it could not be filtered.



Sample.	Specific Gravity.	Moisture, per cent.	Draft, per cent.	Maltose, per cent.	Dextrin, per cent.
Barley.....					
Steep.....	1·0206	11·34	39·650	22·065	15·560
Couch.. ..	1·0213	11·65	38·100	23·570	15·900
1 day on floor.....	1·0223	11·16	37·700	25·155	16·495
2 days on floor.....	1·0231	10·96	37·050	27·795	15·570
3    "    " .....	1·0241	10·38	36·500	30·910	14·330
4    "    " .....	1·0247	10·60	33·650	36·190	11·155
5    "    " .....	1·0250	10·16	32·250	40·785	8·565
6    "    " .....	1·0257	10·52	28·500	41·675	10·510
7    "    " .....	1·0260	10·20	27·935	42·535	12·380
8    "    " .....	1·0264	10·26	26·215	43·535	14·965
Kiln-dried.....	1·0271	10·56	25·900	44·885	13·575

## SOLUTION OF SUBACETATE OF LEAD AS A TEST FOR OLIVE OIL.

BY S. S. BRADFORD, PH.G.

When cotton seed oil is mixed with solution of subacetate of lead a peculiar red color is always produced. In the October number of this JOURNAL, 1882, I called attention to this peculiar color action and gave it as a test for the detection of this oil when mixed with olive oil as an adulterant. The red color produced by the solution is, I am fully convinced, peculiar to this oil, as I have been unable after experimenting with the different seed and animal oils for over ten years to obtain it from any other. This alone would cause it to be a valuable test, but not only cotton seed but any other oil can easily be detected by its use.

Solution of subacetate of lead possesses the peculiar property of saponifying at once when shaken in the cold with pure olive oil. Now if the sample tested contains any cotton seed, or other oil, saponification will not take place no matter how long it is allowed to stand, or how well it may be shaken; if there is any cotton seed oil in the sample the red color will always be produced.

The want of a reliable test for olive oil has long been felt, and I offer this one after a series of experiments with all the different oils covering a period of over ten years, fully convinced that in this test we have one that can safely be relied on.

Charlestown, Mass., July, 1884.

## ACETATE OF MAGNESIUM.

BY A. F. W. NEYNABER, SR.

This preparation has not been brought as fully to the notice of physicians and pharmacists as it undoubtedly deserves. It possesses qualities which entitle it to a better consideration. Acetate of magnesium is very soluble in alcohol as well as in water, so much so that this quality has been spoken of as an objection to its general use, whereas, if we look at it in the proper light, this is one of its great advantages, since it enables us to use it with elixirs, wines, syrups, tinctures, fluid extracts, etc. For all these preparations it can be combined with some pleasant aromatics, with laxatives, such as rhubarb, mandrake, leptandra, etc., in neutral solutions as well as with an excess of acid, such as citric acid, tartaric acid, etc. It acts as a purgative, and if combined with rhubarb, jalap, mandrake, leptandra, buckthorn, senna or other laxatives or cathartics and purgatives a very valuable composition is formed. To illustrate its usefulness and to show in which way it may be dispensed several formulas are given below, yielding preparations which are stable and can be kept any length of time without undergoing any change, while all preparations containing citrate of magnesium have the great disadvantage of not being stable.

It is a well known fact that many of the preparations in the market sold as liquid citrate of magnesia, citrate of magnesia granules, etc., containing a very small percentage of the citrate of magnesium, while the bulk is made up of tartrate of sodium, citrate of sodium, etc., because the pure citrate of magnesium is apt to undergo changes which render the preparation insoluble and unsalable.

If we use an exact quantity of calcined magnesia in making the acetate, and then evaporate to a given weight, we can make exact calculations of the strength of the liquid.

In the following are given some practical formulas for the combination of acetate of magnesium with other laxatives, cathartics, etc.

*Tincture of Rhubarb and Magnesia.*—Calcined magnesia, 2 ounces; acetic acid, a sufficient quantity. Evaporate to 5 fluidounces and 5 fluidrachms. Add ext. rhubarb, 2 fluidounces; fluid ext. cardamom 3 fluidrachms; alcohol, 8 fluidounces. Mix = 1 pint.

*Elixir Cathartic.*—Calcined magnesia, 240 grains; acetic acid, a sufficient quantity; fluid extract of Culner's root,  $\frac{1}{2}$  fluidounce; fluid ex-

tract of butternut bark,  $\frac{1}{2}$  fluidounce; fluid extract of Alexandria senna, 2 fluidounces; flavor, a sufficient quantity; simple syrup, 4 fluidounces; deodorized alcohol, 4 fluidounces; citric acid, 40 to 60 grains; water, sufficient to make 1 pint.

*Elixir laxans* (Laxative Elixir, mild).—Calcined magnesia, 120 grains; acetic acid, a sufficient quantity; fluid extract of Alexandria senna, 2 fluidounces; fluid extract of coriander, 2 fluidrachms; deodorized alcohol, 1 fluidounce; simple syrup, 4 fluidounces; citric acid, 30 to 60 grains; water, sufficient to make 1 pint.

*Elixir of Rhubarb and Magnesia*.—Rhubarb, 10 grains; magnesia, 5 grains to the tablespoonful dose.

Calcined magnesia, 1,280 grains; acetic acid, a sufficient quantity; fluid extract of rhubarb, 5 fluidounces and  $2\frac{2}{3}$  fluidrachms; deodorized alcohol, 2 pints; simple syrup, 2 pints; flavor to suit taste; water sufficient to make 1 gallon.

If desired, citric acid can be added, say about 30 to 60 grains, according to taste.

The U. S. Pharmacopœia of 1880 has the following modified formula for *Liquid Citrate of Magnesium*, using carbonate in place of calcined magnesia as required by the U. S. Pharmacopœia of 1860:

Carbonate of magnesia, 200 grains; citric acid, 400 grains; syrup of citric acid, 1,200 grains; bicarbonate of potassium, 30 grains; water, a sufficient quantity to fill a bottle of about 16 fluidounces.

To replace this by acetate of magnesium, I would propose the following formula:

*Solution of Acetate of Magnesium*.—Carbonate of magnesium, 200 grains; acetate acid, sufficient quantity to neutralize; syrup of citric acid, 1,200 grains; bicarbonate of potassium, 30 grains; water enough to fill a bottle of about 16 fluidounces.

*Liquor Magnesiae Citratis* (U. S. Pharmacopœia, 1860).—Magnesia (calcined), 120 grains; citric acid, 450 grains; syrup of citric acid, 2 fluid ounces; bicarbonate of potassa, 40 grains.

To replace this by acetate of magnesium the following formula might be used:

*Liquor Magnesii Acetatis*, or Solution of Acetate of Magnesium (Magnesia).—Calcined magnesia, 126 grains; acetic acid, sufficient quantity to saturate; syrup of citric acid, 2 fluidounces; bicarbonate of potassa, 40 grains.

*Detroit, Michigan.*

## OBSERVATIONS ON SYDENHAM'S LAUDANUM.

BY EG. DAENEN, Pharmacien in Brussels.

*Reprint, communicated by the Author.*

The results of my observations on Sydenham's laudanum, published in 1872 in the "Jour. de Phar. d'Anvers," showed, 1, that the tannin of the cinnamon and cloves precipitates a portion of the opium alkaloids; 2, that Chinese cinnamon and cassia lignea are richer in tannin than Ceylon cinnamon; 3, that if cinnamon be used for this laudanum, Ceylon cinnamon should be carefully selected; 4, that in replacing the cinnamon and cloves by their volatile oils, the laudanum thus prepared has all the essential properties of that medicine without the inconveniences produced by the ingredients named; 5, that the employment of assayed opium or extract of opium is indispensable in order to have in all pharmacies the preparation of as nearly uniform strength as possible.

The observations reported in the present paper give further confirmation to the above conclusions, and moreover demonstrate that time and light do not exert the destructive action upon the product prepared with the volatile oils, that it does upon the officinal laudanum (Vinum Opii).

Four vials were filled with 1, Sydenham's laudanum prepared according to the (Belgian) pharmacopœia; 2, the same, prepared with Chinese, in the place of Ceylon cinnamon; 3, the same, prepared with the oils of cinnamon and cloves; and 4, with Malaga wine. These vials were sealed by Professor Gille and after more than four years were reexamined with the following results: No. 1 was of a dingy brown and contained much precipitate; No. 2 was more of gray color and a larger amount of precipitate; No. 3 had retained its original color and contained only a slight precipitate; No. 4 had also preserved its color and contained a precipitate similar to that in No. 3.

The importance of the subject justifies a repetition in stating that a wine of cinnamon or of cloves, on being added to a vinous tincture of opium or of extract of opium produces at once a turbidity and abundant precipitate, and filtration does not completely prevent the reappearance of a precipitate; Sydenham's laudanum shows a similar behavior. But a wine of saffron or vinous solutions of oil of cinnamon or of cloves, added to a vinous solution of opium or of extract of opium,



produce no apparent disturbance, cause no precipitate, and yield mixtures which remain unaltered, practically, for an indefinite period.

The preparation of Sydenham's Laudanum has been the subject of numerous investigations; many regard it as a pharmaceutical preparation leaving much to desire, and all agree that the precipitate forming therein contains a portion of the opium alkaloids. For further investigation in this direction, 9 Gm. each of Ceylon cinnamon and of cloves were exhausted with sufficient Malaga wine to obtain 600 Gm. of liquid; and 67 Gm. of extract of opium were dissolved in sufficient Malaga wine to obtain 400 Gm. of liquid. Both liquids were perfectly transparent, but on being mixed, became at once strongly turbid. On passing it now through a filter, weighing 25 Gm., the weight of the latter was increased to 58 Gm., or 33 Gm. of dry matter were precipitated from the laudanum. The precipitate was diffused in water, acidulated with acetic acid, and the mixture heated and filtered; the filtrate was dark colored and yielded a precipitate with ammonia. After repeating this operation three times, the precipitate was collected upon a filter washed with distilled water and dried; it weighed 0.15 Gm. and gave all the characteristic reactions of morphine.

It is shown from these experiments 1, that cinnamon as well as cloves, causes in solutions of opium a precipitate containing a portion of the alkaloids, and 2, that the oils of cinnamon and of cloves do not produce such precipitates.

In proposing a modification in the preparation of a medicine which has been used for more than two centuries, it is not sufficient to show pharmaceutical incompatibility, but it should also be considered whether the change would not likewise alter the therapeutic action.

In opium preparations we generally endeavor to modify the narcotic action by associating it with various ingredients as correctives. These ingredients present two particularities, either by acting upon the opium itself, modifying its chemical nature and changing its action and the nature of the impression produced, as is the case with Rousseau's laudanum (by fermentation); or without changing its constitution, by acting with it and directing its influence. The former seem to diminish the stupefying action of opium, while the latter yield mixtures having narcotic and stimulating properties. Cinnamon and cloves are stimulants used in connection with opium; if deprived of tannin, their effect is a useful modification of the stupefying action of poppy juice.

The modification proposed by me follows from the foregoing and

consists in substituting 20 drops each of the oils of cinnamon and of cloves, for 9 Grams of cinnamon and of cloves, directed for 1,000 parts of the laudanum. Thereby the active principles of the medicament are preserved, the loss of a notable portion of the product during the process of preparation is avoided, and the composition is not sensibly altered on keeping, since scarcely any precipitate is formed.

For a long time I have prepared Sydenham's laudanum in this manner, and physicians, who have used it, have found it satisfactory. The new French Codex has replaced Malaga by Grenache wine in making this preparation; but all wines being more or less variable, a greater uniformity with the preparation in question would be attained, if, in place of wine, alcohol of a certain strength was directed.

## CHEMICAL AND PHARMACOGNOSTICAL NOTES.

*Euphorbia pilulifera*.—Dr. C. C. Baker, of New Mexico, reports in the "Therapeutic Gazette," for January, 1884, his use of this plant in two cases of asthma. The results in both were very prompt and satisfactory. This tropical weed has been long used in aphthæ and as an alterative. As far as may be judged from the sensible properties, the virtues of the plant are probably not superior to those of the closely allied indigenous weeds *Euph. maculata* and *hypericifolia*. A western species, *Euph. humistrata*, *Engelmann*, appears to be in popular use in some localities as a remedy for bowel complaints.

*Hazigne*.—In the "Journal de Pharmacie" for June (p. 456) Professor H. Baillon describes a Malagasy plant called "hazigne," the fruits of which yield an oil, and the stem a resin, which are used by the natives as a remedy in certain skin diseases, such as leprosy, the itch and ulcers. The oil obtained from the seeds is also used as food and for lamps. The hazigne is a handsome tree belonging to the Guttifereæ, and is named *Symphonia fasciculata*. The fruit is known to the natives by the name of "voa-sou-voûara." Some of the seeds are now being submitted to chemical analysis by Messrs. N. J. Regnaud and Villejean.—*Phar. Jour. and Trans.*, June, p. 1048.

*Phaseolus limatus*, *Lin.*.—In the "Practitioner" (p. 435) it is pointed out that the *Pois d'Achery*, a sort of kidney bean (*Phaseolus limatus*, L.), cultivated in the Mauritius and used there as an occasional article of diet by the Creoles, exists in the form of two varieties; the

one white, which is generally esteemed wholesome, and the other very prettily variegated, which is regarded as poisonous. The poisonous character of the latter is due, according to Drs. Davidson and Stevenson, to hydrocyanic acid, which is formed when the beans are macerated in water by a similar process to that by which it is produced in certain plants of the Rosaceæ, such as the almond and cherry laurel. The reason why two varieties of a plant which cannot be distinguished from each other by any definite botanical characters should produce different chemical compounds is a most interesting problem, and seems to deserve further investigation.—*Ibid.*

*Croton morifolius*.—A Mexican plant, by name "palillo," has recently been the subject of experiment in France, by Messrs. Dugees and Armendaris ("Bull. Soc. Bot.," [2], v., p. 233). Two or three drops of the oil contained in the seeds act like a moderate dose of castor oil. The natives of Mexico use the leaves of the plant in the form of infusion as a remedy for gastralgia and atony of stomach. The tincture of the leaves is said by the above-named experimentalists to give excellent results in neuralgia, especially when occurring in the face, either when used as liniment, or dropped into the ears, or taken in the dose of 10 or 15 drops in orange-flower water.—*Ibid.*

*Sizygium jambolanum* is an East Indian plant belonging to the natural order Myrtaceæ, the fruit of which has recently been somewhat in demand on the Continent for use in the treatment of diabetes. M. Banatralla ("Répertoire de Pharmacie," p. 169) has found, in three cases in which he has tried it, that its use led to a diminution in the amount of urine secreted, and that it caused the disappearance of the sugar. These results were manifested in forty-eight hours after taking the medicine. During the time that the patients were submitted to the action of the drug they could take amylaceous food with impunity. The astringent rind of the fruit appears to be the active part.

*Borneol from Camphor*.—By C. L. Jackson and A. E. Menke ("Amer. Chem. Jour." [v], pp. 270–271). The camphor is dissolved in 10 parts of alcohol, a small excess of sodium gradually added, and the alcohol distilled off; water precipitates crude borneol. After washing with water it is crystallized from alcohol. The reaction is expressed:  $C_{10}H_{16}O + H_2 = C_{10}H_{18}O$ ; the yield is excellent, 94 per cent. of the theoretical amount being obtained.—*Jour. Chem. Soc.*

*Matico-camphor*.—A specimen of matico-camphor (from *Piper angustifolium*), examined by K. Kügler ("Ber." [16], pp. 2841–2843, had

the odor and taste of matico-leaves, and melted between  $89^{\circ}$  and  $103^{\circ}$ . After repeated crystallizations, it melted at  $94^{\circ}$ , the mother-liquors containing a yellow amorphous resin. Matico-camphor exhibits a rotatory motion on the surface of water; it is not attacked by aqueous alkalis, is readily soluble in alcohol, ether, chloroform, benzin, and light petroleum. The pure substance lacks both taste and odor. In contact with hydrochloric acid, it assumes an intense violet color, which changes to blue and then to green, the compound yielding brown crystals from ether, showing green fluorescence, and having an ethereal odor. With sulphuric acid, it becomes yellow, then red, and finally violet. With sulphuric and nitric acids, it assumes first a yellow, then a violet, and finally a blue color. Matico-camphor has the formula  $C_{12}H_{20}O$ ; it is, perhaps the ethyl-derivative of ordinary camphor.—*Ibid.*

*Mannitol in the ananas.*—In the course of the analysis of ananas from Pernambuco and Brazil, L. Lindet ("Bull. Soc. Chim." [40], pp. 65-66) isolated crystals of mannitol; the quantity obtained was equal to more than 1 per cent. of the fresh fruit. The identity of the crystals with mannitol was established by combustion, crystalline form, solubility, and absence of rotatory and cupric oxide reducing power.

*Function of tannin in plants.*—E. Kutscher ("Bied. Centr.," 1883, p. 713).—Investigations were made with *Vicia faba*, *Helianthus tuberosus* and *annuus*, *Ricinus sanguineus*, and *Phaseolus multiflorus*, plants well adapted for the purpose, as they were found to be typical examples of the different locations of tannin; inasmuch as it is distributed throughout the plant in the *Vicia* and *Helianthus*, whilst it is only local and inactive in the *Ricinus* and *Phaseolus* plants. In the last two species, tannin is not found in the top of the plants, nor in the cell-walls, nor in the general sap during the period of vegetation; moreover, it is never equally distributed throughout the tissue-complex, but is confined in separate secluded cells where it, at the most, changes to a red coloring matter without being used in the general development, whilst with the *Vicia* and *Helianthus* tannin is found in all the tissues soon after germination, but disappears with the formation of organs. *Vicia* tannin is iron-green, *Ricinus* iron-blue. Tannin apparently takes part in the formation of and primary differentiation of the tissues, but does not take part in the further growth of the cell-walls; the most feasible use attributed to this substance is in aiding respiration.

*Separation and Estimation of digitalin, digitalein and digitin.*—The



German method of separating digitalin from the other compounds occurring in *Digitalis purpurea* is based on the precipitation of the former by means of tannin; the French method on the insolubility of digitalin and digitin in water, digitaleïn being readily soluble.

Both methods are troublesome and demand much time. R. Palm ("Anal. Zeitschr. [23], pp. 22, 23) extracts the powdered herb with water, filters the solution through animal charcoal until it is colorless, and precipitates the organic acids with neutral plumbic acetate. A solution of lead acetate and alcoholic ammonia is then added to the filtrate as long as a precipitate is produced. This contains all the principles and is washed with water, and decomposed with hydrogen sulphide. The solution, separated from the precipitate, contains all the digitaleïn, the precipitate consisting of plumbic sulphide, digitalin and digitin. The digitalin is extracted from the dried residue by chloroform, and digitin with alcohol.

*Action of Bromine on pilocarpine.*—(Chastaing, *Comp. Rend.* [97], pp. 1435–1437.) When bromine is added to a solution of pilocarpine in chloroform, there is development of heat, the mixture becomes acid, and a heavy oily liquid separates. The supernatant chloroform retains the excess of bromine together with a small quantity of the bromo-derivative, which gradually crystallizes out. The oily liquid is rapidly evaporated, and forms a deep golden-yellow resinous mass, which is then dissolved in chloroform, from which it separates in a mass of minute prismatic crystals. These crystals have the composition  $C_{11}H_{15}N_2O_2Br_5$ , and consist of a *dibromide of dibromopilocarpine hydrobromide*,  $C_{11}H_{14}Br_2N_2O_2HBr, Br_2$ . This substance is inodorous, but when exposed to air it absorbs moisture and gives off ethyl bromide, undergoing some alteration which results in the formation of a compound containing less carbon than the original substance. In contact with copper, dibromide of dibromopilocarpine hydrobromide gives up part of its bromine, and when treated with silver oxide in presence of water and chloroform, it loses  $Br_3$  and yields dibromopilocarpine,  $C_{11}H_{14}Br_2N_2O_2$ , which resembles pilocarpine in appearance, but is less mobile and less strongly alkaline; it is precipitated by platinum chloride.

The action of bromine on pilocarpine in presence of a small quantity of water does not yield dibromide of dibromopilocarpine hydrobromide, but the corresponding derivative of a feebler base which contains an atom of carbon less than pilocarpine. This carbon is given off as car-

bonic anhydride, and the compound formed should be represented by the formula  $C_{10}H_{14}N_2O_2$ ,  $HBr$ ,  $Br_2$ .—*Jour. Chem. Soc.*

*Examination of fats.*—E. Valenta (*Dingl. polyt. J.* [249], pp. 270–273) has examined a series of fats by a method proposed by J. Köttstorfer, for the detection of foreign fats in butter. The fat to be examined, if necessary, is filtered whilst warm, and a weighed portion is saponified with standard alcoholic solution of potash. After warming on the water-bath about fifteen minutes, the excess of potash is titrated by half normal hydrochloric acid, using phenolphthaleïn as indicator. Pure butter fat requires per gram about 227 mgrms. of potassium hydroxide for saponification, whilst many fats used for adulteration, such as suet, lard, bacon fat, mutton fat, rape oil, olive oil, oleomargarin, poppy oil, and walrus oil, require about 197 or 198 mgrms. The author has examined both animal and vegetable fats. Some of the results obtained tend to throw doubt on the suitability of the method for butter testing, whilst in other cases the nature of single fats can be ascertained, and adulteration can be detected quantitatively if somewhat considerable. The results obtained are given in tabular form. Palm-kernel oil with 247 mgrms., and cocoa nut oil with 257 to 268 mgrms., are much higher than any others of the list, excepting cod liver oil with 213 mgrms. Cocoa nut oil contains not inconsiderable quantities of lauric and myristic acids, also small quantities of caprylic acid, etc. These acids contain much less carbon in the molecule than do palmitic, stearic, and oleic acids, hence the high saponifying value of this fat. Apricot-kernel oil, oil of sweet almonds, oil of bitter almonds, arachis oil, cotton-seed oil, olive, sesame oil, average 193 mgrms. Pumpkin seed oil, oil-cake oil, rape oil (Hungarian product), average 188.1 mgrms. Rape oil, mustard seed oil, and castor oil, average 177.1 mgrms. American bone fat, goose fat, pig fat, average 191 to 196.—*Ibid.*

*Examination of beeswax.*—(Hübl, *Dingl. polyt. J.* [249], pp. 338–342.) Along with physical examination, F. Becker's saponifying test is of value. This test is given as Köttstorfer's butter test. According to Becker, 1 gram beeswax requires 97 to 107 mgrm. potassium hydroxide for complete saponification. By mixing various waxy substances, impure beeswax can be made to give the same number. This difficulty can be overcome by ascertaining not only the total amount of potash required for complete saponification, but also that required to saturate the free acid (cerotic acid) present. Two numbers are thus

obtained, which bear the constant relation of 1 : 3·7, as determined in about twenty samples of yellow wax. About 4 grams wax is treated with 20 cc. neutral 95 per cent. alcohol, heated to fusion, and titrated with alcoholic potash solution, phenolphthaleïn being used as indicator. When the first number has been obtained, 20 cc. potash solution are added, and the excess titrated with half normal hydrochloric acid. For the acid in 1 gram wax about 19 to 21 mgrm. KHO are required, and for the saponification 73 to 76 more are required. The proportion varies between 1 : 3·6 and 1 : 3·8, and the total potassium hydroxide used is 92 to 97 mgrm. The author designates the numbers thus obtained as acid number, ether number, and saponifying number, respectively. Wax substitutes give very different values for these numbers, as the following average results show :

Substance.	Acid number.	Ether number.	Saponifying number.	Proportion ether: acid.
Japan wax.....	20	200	220	10
Carnauba wax.....	4	75	79	19
Tallow .....	4	176	180	44
Stearic acid.....	195	0	195	0 : 195
Resin.....	110	1·6	112	0·015
Neutral substances.....	0	0	0	0
Paraffin.....				
Ceresin.....				
Yellow beeswax.....	20	75	95	3·75

Hence if the saponifying number falls below 92 with a proper proportion, the wax is adulterated with an inert substance (*i. e.*, paraffin). If the proportion be greater than 3·8, an addition of Japan or carnauba wax or tallow is probable. If the acid number be low, Japan wax is excluded, and of the remaining two the ether number will determine which has been used. If the proportion be below 3·6, stearic acid or resin has probably been added. It is also clear that the simultaneous presence of an active and an inactive substance may be detected by the figures obtained. The subject is being further investigated.—*Ibid.*

*Gelatin.*—H. Weiske ("Bied. Centr." 1883, p. 673) has prepared gelatin in various ways, and has found that the products differ in properties. Pieces of bone were treated repeatedly and for a long time with dilute hydrochloric acid to remove the inorganic matter as com-

pletely as possible; they were then washed. Gelatin made from this is not precipitated from its solutions by tannic acid unless a few drops of a solution of a salt (sodium chloride, etc.) are added simultaneously; in other respects it does not differ from ordinary gelatin. By boiling bones free from mineral matter with repeated quantities of water, and then dissolving the residue by heating with water under pressure, two solutions are obtained which when evaporated to dryness at  $100^{\circ}$  yield two kinds of gelatin differing from one another and also from the above variety in various properties.

*Valuation of Gelatin.*—F. Prollius (*Dingl. polyt. J.* [249], p. 425) has determined the amount of ash, water, and insoluble matter (residue insoluble in hot water) in various kinds of gelatin. To ascertain the gelatinizing property 1 part of the sample was dissolved in 90 parts of water, filtered, and the degrees of viscosity determined.

	Ash.	Water.	Insoluble.	Time required for the solu- tion to run out.
	per cent.	per cent.	per cent.	seconds.
Astracan from Schmidt and Dihlmann, Stuttgart.....	0.20	16.0	2.8	507
From a collection.....	0.37	18.0	0.7	485
Fine iridescent Russian quality, Tü- bingen collection.....	1.20	17.0	1.0	500
Russian, from Gehe of Dresden.....	0.80	19.0	3.0	491
In laminae, from Gehe.....	0.50	19.0	0.4	480
In threads, known as Hamburg threads.....	0.40	17.0	1.3	477
Hamburg isinglass.....	1.30	19.0	2.3	470
Another quality.....	0.13	19.0	5.2	.....
Rolled northern fish bladder.....	3.20	1.5	10.8	467
Icelandish bladder.....	0.60	17.0	21.6	463
Indian isinglass.....	0.78	18.0	8.6	437
Yellow, quality unknown.....	2.30	17.0	15.6	360

To judge of the purity of isinglass, it is also recommended to subject the sample to microscopic examination.—*Ibid.*

*Wine Examination.*—(*Dingl. polyt. J.* [249], pp. 311–312) Accord-  
ing to S. Kilicsan, not only young wines but old and well kept wines  
contain ammonia; in six samples from 0.0057 to 0.0113 per cent. was  
found. Formic acid can often be detected in the distillate from un-



sulphured wines. Since the precipitate produced in a wine distillate by silver nitrate contains carbon, probably from the presence of organic acids, Kiliesan considers Wartha's process for the detection of sulphurous acid in wines to be untrustworthy.

J. Nessler and M. Barth give a method for estimating free tartaric acid in wine as an improvement of the original Berthelot-Fleurieu's process. 50 cc. of wine are evaporated to thin syrup, this is well shaken with 70 cc. of 96 per cent. alcohol, and allowed to stand four hours in a cool place, to permit the tartrate to settle out. The precipitate is separated, and its acidity reckoned as tartrate. The filtrate is freed from alcohol, and 0.5 cc. of acidified 20 per cent. solution of potassium acetate is stirred into the syrupy residue, and the newly formed tartrate is estimated as before. But this method fails in case of wines strongly plastered, although negative values cannot be obtained, as are sometimes got by the older method.

For the estimation of sugar by Fehling's solution, the tannin must first be removed by lead acetate, the excess of lead being removed by sodium carbonate. Ordinary fully fermented wine usually contains under 0.1 per cent. sugar, and may be decolorized by a small quantity of animal charcoal; after rendering it alkaline with a little caustic alkali or carbonate, 5 cc. is warmed with 2 cc. Fehling, in a water-bath. If the blue color completely disappears the wine contains over 0.2 per cent. sugar. If the blue color persists 5 cc. more wine may be added, and the warming repeated. In this way an approximation to the amount of sugar may be made.

*Decolorizing action of ferric salts on indigo.*—L. Margary ("Gazzetta" [13], pp. 374, 375). In experiments on certain iron mordants for silk containing ferric sulphate and nitric acid, it was necessary to determine the amount of nitric acid present. This was done by means of indigo solution, and the author observed that the results were invariably too high. This he attributed to the oxidizing action of the ferric salt, and found on heating the indigo solution with pure ferric sulphate that it was rapidly and completely decolorized, the ferric being reduced to a ferrous salt.—*Jour. Chem. Soc.*

*Estimation of phenol in commercial carbolic acid.*—Kleinert ("Anal. Zeitschr." [23], pp. 1 to 13) has compared the results of estimating phenol by Koppeschaar's method (titration by means of standard bromine solution) and by fractional distillation. He finds that they in nowise agree, the bromine titration yielding figures which are far

higher than the quantity of phenol which can be present. All samples which he examined yielded but a very small proportion of products volatile between  $150^{\circ}$  and  $200^{\circ}$ , phenol distilling between those temperatures. Between  $200^{\circ}$  and  $250^{\circ}$  the largest fractions are obtained, practically devoid of phenol, and yet giving copious bromine precipitates. Even at temperatures higher than  $250^{\circ}$  distillates are obtained, which give the bromine reaction, but do not show the well-known phenol indications with ferric chloride, hypochlorite, or fir-wood and hydrochloric acid. Kleinert therefore concludes that Koppeschaar's method is not applicable for the valuation of commercial carbolic acid.

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## THE FIRST PHARMACOPŒIA,

PUBLISHED IN THE UNITED STATES OF AMERICA.

The Editor of the AMERICAN JOURNAL OF PHARMACY on a recent visit to Lancaster, Pa., was shown by Mr. Chas. A. Heinitsh, a little work, of whose existence he was not aware. Diligent inquiry among pharmacists and physicians in Philadelphia seems to show that this "Pharmacopœia" is now entirely unknown in Philadelphia, and is not to be found here in libraries. On applying to the librarian of the Surgeon General's office, Dr. Robert Fletcher, Assistant Surgeon U. S. A., kindly gave the information, that since the publication of the first volume of the Index Catalogue, a copy of the first edition of this Pharmacopœia, published in 1778, has come into the possession of the library, and that the title page is exactly like the one given further on, excepting that the name of Dr. William Brown does not appear, and that the publishers are Styner and Cyst.

From Mr. Heinitsh it is learned that the hospital of the United States Army, located in Lititz, Lancaster Co., Pa., was in the building at present occupied by the Lititz Academy, formerly the Brothers House, and that a number of soldiers died there and were buried near the village.

The "Pharmacopœia" is printed entirely in Latin upon 32 pages, the printed text occupying upon each page  $4\frac{1}{2}$  inches in length and  $2\frac{1}{2}$  inches in width. In the following the English translation of the title and preface, made by Professor Nevin, of Franklin and Marshall College, is added; with this exception, no alteration or addition has been made.

July, 1884.

## PHARMACOPOEIA

## REPERTORY

Simpliciorum &amp; Efficaciorum,

OF

IN USUM

Simple and Efficacious Prescriptions,

NOSOCOMII MILITARIS,

FOR THE USE OF THE

AD EXERCITUM

MILITARY HOSPITAL,

Fœderatarum Americæ Civitatum

BELONGING TO THE ARMY

PERTINENTIS;

OF THE

HODIERNÆ NOSTRÆ INOPLÆ

UNITED STATES OF AMERICA.

RERUMQUE ANGSTIIS,

Feroei hostium sævitie, belloque  
crudeli ex inopinato patriæ nostræ  
illato debitis,

ADAPTED ESPECIALLY TO OUR PRESENT  
STATE OF NEED AND POVERTY, WHICH  
WE OWED TO THE FEROCIOUS CRUELTY  
OF THE ENEMY, AND TO A CRUEL  
WAR BROUGHT UNEXPEC-  
TEDLY UPON OUR  
FATHERLAND.

MAXIME ACCOMMODATA.

AUCTORE GULIELMO BROWN, M. D.

WM. BROWN, M. D., AUTHOR.

Editio Altera.

SECOND EDITION.

PHILADELPHIÆ:

PHILADELPHIA:

Ex Officina CAROLI CIST.

FROM THE OFFICE OF CHARLES CIST.

M.DCC.LXXXI.

1781.

## DISTINGUUNTUR

asterisco medicamentorum formulæ,  
quæ apud commune operarium præ-  
parari et componi debent; cæteræ  
inter nosocomiorum officinas sunt  
extemporè miscendæ.

Plurimæ sunt formulæ solidæ et  
siccæ quæ commodius vel saltem ele-  
gantius liquidâ formâ adhiberi pos-  
sent, nisi defuerit imprimis phialarum  
copia; et omnia, quæ minus  
efficacia, pro recipientibus vel causa  
elegantiae tantum usui sunt, quales  
aquæ simplices, &c. variaque em-  
plastra et unguenta vix necessaria  
aut utilia, transportandi incommo-  
ditare velimus.

With an asterisk, are denoted such  
prescriptions, as ought to be prepared  
and compounded in the general labo-  
ratory, the others are to be mixed  
for the occasion at the office of the  
hospitals.

There are very many prescriptions  
of medicines, solid and dry, which  
might be afforded more convenient  
for use, or, at any rate, more elegantly,  
in a liquid form, were there not want-  
ing for this a sufficiency of phials;  
and all such preparations as are less  
efficacious, or for patients made use  
of only for the sake of elegance,  
such as simple waters, etc. and vari-  
ous plasters and unguents hardly  
necessary or useful, from the incon-  
venience of transportation, it is our  
desire to avoid.

LITITZ, Mart. 12, 1778.

LITITZ, March 12, 1778.

# PHARMACOPOEIA, &c.

## PARS I.

### MEDICAMENTA INTERNA.

#### 1. AQUA ACIDULA. (*Posca* Roman.)

*REC.* Aceti vinosi, vel,  
 pomacei, *unc.* iv, vel  
 Pulv. cren. tartar. *drachm.* ii.  
 Aquæ fontanæ *lib.* iss. Misce.  
 Pro potu communi antiseptico, *unc.*  
 iv. 6ties die, vel ad libitum, sumen-  
 dæ:  
 Addi possint, pro re nata, spiritus  
 vini tenuis *unc.* ii.

#### 2. AQUA VINOSA.

*REC.* Vini Maderensis *unc.* viii. vel<sup>1</sup>  
 rubri *unc.* xii.  
 Aquæ fontanæ *lib.* i. Misce.  
 Pro potu—in statu ac decursu febris  
 castrensis et malignæ utendo, ad  
 vacillantem tonum corporis susti-  
 nendum, *viresque naturæ medica-*  
*trices* refocillandas, evocandasque  
 —*unc.* iv. 6ties die, vel sæpius  
 sumendæ.

#### 3. AQUÆ HORDEATA, ORIZATA, ex PANE COCTO, vel ex PANE TOSTO.

Fiunt priores tres coquendo hordei  
 perlati, vel orizæ *unc.* ii. vel panis  
 domestici *unc.* iv. in aquæ fontanæ  
*lib.* iv. ad dimidii consumptionem,  
 i. e. ad *lib.* ii; et *aqua ex pane*  
*tosto*, infundendo per semihoram  
 panis tosti jam præ foco ferventis  
*unc.* iv. in aquæ fontanæ *lib.* ii.  
 Usurpari possint hæc pro potu com-  
 muni, et inter se mutari vel pro  
 ægri desiderio, vel promptuarii  
 rerumque nosocomii commodo.

#### 4. AQUA CALCS.

*REC.* Calcis vivæ *lib.* i.  
 Affunde gradatim

Aquæ fontanæ *cong.* ii.

Post

Post ebullitionem, subsidentia depu-  
 retur mixtura; deinde per chartam  
 coletur, et in vasis vitreis bene  
 clausis servetur.

Dosis a *lib.* i. ad *lib.* ii. die.

Utilis est etiam in chirurgicis, pro  
 lotione, ad ulcera mali moris, &c.

#### 5. BOLUS e CRETA.

*REC.* Cretæ ppt. *scrupul.* i.  
 Laudani liquidi *gutt.* v.  
 Mucilag. gum. Arab. q. s.  
 Sumendus 2da 3tia vel 4to quaque  
 hora.

#### 6. BOLUS VOLATILIS.

*REC.* Sal. C. C. volat. vel  
 Sal. ammon. volat. (a)  
 Camphoræ ana *gr.* v.  
 Conserv. rosarum q. s.  
 Pro una dosi 3tia vel 4ta quaque hora  
 sumenda.

#### 7. Fit etiam cum OPIO, addendo Opii puri *gr.* ½

Eodem modo sumendus.

#### 8. BOLUS e RHÆO cum MERCURIO.

*REC.* Pulv. rhæi *gr.* xxv.  
 Calomel. ppt. *gr.* v.  
 Syrup. sacchar. q. s.  
 Mane sumendus.

#### 9. BOLUS LIXIVIALIS.

*REC.* Sal. tartar. *gr.* x.  
 Conserv. rosar. *scrupul.* i. M.  
 Ter quaterve die sumendus.

#### 10. COLLYRIUM VITRIOLICUM.

*REC.* Vitriol. albi *scrupul.* i.  
 Aquæ fontanæ *unc.* iv. M.  
 Ter die utendum.

#### 11. \*CONSERVA ROSARUM. Pharm. Lond.

#### 12. DECOCTUM CORTICIS PERUVIANI.

*REC.* Pulv. crass. cort. Peruvian.  
*unc.* i.  
 Aquæ fontan. *lib.* iii.  
 Coque

(a) Si desit sal volatile ad hunc  
 bolum componendum, uti possint ejus  
 loco sal. ammoniac. crud. *gr.* x. cum  
 sal. tartar. *gr.* v. quo sal volatile  
 ammoniac. extemporè preparatur.



Coque ad *lib.* ii. et cola.

Dosis ab *unc.* i. ad *unc.* iv. quaque,  
vel 2da quaque hora.

### 13. DECOCTUM CORTICIS cum SER- PENTARIA.

Fit addendo decocto corticis Peru-  
viani, sub finem coctionis,  
Rad. serpentariæ contus.  
*semunciam.*

Dosis ab *unc.* i. ad *unc.* iii. quaque,  
vel 2da quaque hora.

His utrisque addi possit, pro re nata,  
Elixir vitrioli acid. *drachm.* i.

### 14. DECOCTUM CORTICIS cum VINO.

Fit addendo decocto cort. Peruviani  
Vini rubri *lib.* ii. vel

*REC.* Singulorum P. *E.* et misce.  
Dosis ut decocti cort. Peruvian.

### 15. DECOCTUM RADICIS SARSAPA- PARILLE.

*REC.* Rad. sarsaparill. *unc.* iii.

Aquæ fontanæ *lib.* iii.

Coque ad *lib.* ii. et sub finem cocti-  
onis adde

Rad. glycyrrhiz. *drachm.* ii.

Colature dosis a *lib.* i. ad *lib.* ii. die.

Adde, pro re nata,

Vini antimonialis *drachm.* ii.

### 16. DECOCTUM TORMENTILLE.

*REC.* Rad. tormentillæ contus. *unc.* i.

Pulv. C. C. C. *unc.* ii.

Pulv. gum. Arabie. *semun-  
ciam*

Aquæ fontanæ *lib.* iii.

Coque ad *lib.* ii. et sub finem cocti-  
onis adde

Cort. cinnamomi contus.  
*drachm.* i.

Colature admisce

Sacchari albi *drachm.* ii.

Dosis ab *unc.* ii. ad *unc.* iv. ter qua-  
terve die.

Adde, pro re nata,

Laudani liquidi *gutt.* xl.

### 17. ELECTARIUM CORTICIS CHALY- BEATUM.

*REC.* Pulv. cort. Peruvian. *unc.* i.  
Rubiginis, vel limiture ferri  
ppt.

Pulv. canellæ albæ ana  
*drachm.* ii.

Syrupi q. s. M.

Dosis *drachm.* i. ter quaterve die.

### 18. \*ELECTA-

### 18. \*ELECTARIUM LENITIVUM. *Pharm. Edin.*

Vel, omittatur cassia fistularis,  
et duplicentur tamarindi.

Dosis *drachm.* ii. mane.

### 19. ELECTARIUM LENITIVUM cum NITRO.

*REC.* Elect. lenitiv. *unc.* ii.

Pulv. sal. nitri *semunciam.* M.

Dosis *drachm.* i. bis terve die.

### 20. ELEC. LENITIVUM BALSAM.

*REC.* Elect. lenitiv. *unc.* ii.

Balsam. capivi

Gum. guaiac. ana *semunciam.*  
M.

Dosis *drachm.* i. omni nocte, vel  
mane et vespere.

### 21. ELECT. seu LOHOCH de SPER- MATE CETI.

*REC.* Spermatidis ceti *unc.* i.

Mellis *unc.* ii.

Balsam. Peruvian. *drachm.* ss.  
M.

Dosis *drachm.* i. 2da quaque hora,  
vel sæpius, urgente tussi.

### 22. Fit etiam, cum OPIO, addendo Laudani liquidi *drachm.* i.

### 23. \*ELIXIR PAREGORICUM. *Pharm. Lond.*

### 24. \*ELIXIR VITRIOLI ACIDUM.

*REC.* Canellæ albæ.

Rad. zingiberi ana *unc.* i.

Spiritus vini tenuis *lib.* ii.

Digere leni calore, et cola: Adde  
gradatim miscendo

Olei vitrioli *unc.* viii.

Mixtura subsidentia depurata coletur  
per chartam.

Dosis *gutt.* xxv. bis terve die, in  
poculo aquæ fontanæ sumendæ;  
vel misceri possit cum potu com-  
muni ad gratam aciditatem.

### 25. ENEMA COMMUNE.

*REC.* Aquæ fontanæ calidæ *unc.* xii.

Salis communis *semunciam*

Olei olivarum, vel ol. sem. lini,  
vel axungie porcine *unc.* i.

M.

### 26. ENEMA

26. ENEMA ANODYNUM.

*REC.* Infusi seminum lini *unc.* vi.  
Laud. liquidi *gutt.* xl. M.

27. EPITHEMA VESICATORIUM.

*REC.* Unguenti basilic. flav. super  
alutam, linteum, vel chartam  
crassè extensi, q. s.

Asperge

Pulv. subtil. cantharidum, q. s.  
Post levem manu pressionem, excute  
superfluum pulverem unguen-  
to non hærentem :

Pauxillo aceti madefactâ prius cute,  
applicetur.

28. FOTUS ANODYNUS.

*REC.* Capit. papaver. hortens. *unc.* i.  
Aque fontane *lib.* iii.

Coque ad *lib.* ii. et adde  
Aceti *lib.* ss.

Vel eidem quantitati aque calidæ  
et aceti adde laud. liquid.  
*drachm.* ii.

29. FOTUS SPIRITUOSUS.

*REC.* Aque calidæ *lib.* ii.  
Aceti  
Spir. vini tenuis ana *lib.* ss. M.

30. GARGARISMA COMMUNE.

*REC.* Sal. nitri *drachm.* i.  
Aceti *unc.* ii.  
Mellis *semunciam*  
Aque fontane *unc.* vi. M.

31. GARGARISMA ADSTRINGENS.

*REC.* Decocticort. Peruvian. *unc.* vi.  
Elixir vitrioli acid. *drachm.* i.  
Mellis *unc.* i. M.

32. HAUSTUS ANODYNUS.

*REC.* Laudani liquidi *gutt.* xxv.  
Aque fontane *unc.* iss.  
Syrupi *drachm.* ii. M.

33. INFUSUM CHALYBEATUM.

*REC.* Rubiginis, vel limaturæ  
ferri ppt. *unc.* iv.  
Rad. gentiane contus. *unc.* ii.  
Cort. Canelle albæ contus.  
*unc.* i.  
Vini pomacei veteris *lib.* viii.

Infunde per aliquot dies.  
Dosis *unc.* ii. ter quaterve die.

34. INFU-

34. INFUSUM SEMINUM LINI.

*REC.* Sem. lini integr. *unc.* ii.  
Aque bullientis *lib.* iv.

Sepone ad focum per horas duas,  
et cola.

Dosis *unc.* iv. 6ties die; vel pro potu  
communi.

35. INFUSUM SASSEAFRAS.

*REC.* Radicis, ligni, vel corticis sas-  
safras contus. *unc.* i.  
Aque bullientis *lib.* iv.

Infunde per 4 horas, et cola.

Dosis *unc.* iv. 6ties die.

Addi possit, pro re nata,  
Vini antimomialis *semuncia.*

36. INFUSUM SERPENTARIE.

*REC.* Rad. Serpentariæ *unc.* i.  
Aque bullientis *lib.* ii.

Infunde per 4 horas, et cola.

Dosis *unc.* ii. 3tia vel 4ta quaque hora.

37. INFUSUM SENNÆ.

*REC.* Fol. sennæ *semunciam*  
Fruct. tamarind. *unc.* i. vel  
Pulv. crem. tartar. *semunciam.*  
Aque bullientis *lib.* i.

Infunde per horam, et cola.

Pro unâ dosi. *unc.* iv. quaque semi-  
horâ sumendæ ad alvi solutionem.

38. INJECTIO MERCURIALIS.

*REC.* Unguenti mercurialis *semun-  
ciam* :

Solve in

Olei olivar. vel amygdal. d.  
*unc.* iv.

Utende mane et vespere, vel ter die.

39. INJECTIO BALSAMICA.

*REC.* Balsam. capivi *drachm.* ii.  
Ol. olivar. vel amygdal. d.  
*unc.* iv. M.

Utenda mane et vespere, vel ter die.

40. LINIMENTUM ANODYNUM.

*REC.* Axungie porcine *unc.* ii.  
Laudani liquidi *semunciam.*

Misce intime.

Ad hæmorrhoides; vel ad dolorem  
spasticum aegrè tolerabilem.

41. LINI-

## 41. LINIMENTUM CAMPHORATUM.

REC. Camphoræ *semunciam*.Ol. olivarum, amygdal. dulc.  
juglandum, vel sem. lini sine  
calore expressi *unc. ii. M. s. a.*

## 42. LINIMENTUM VOLATILE.

REC. Linimenti camphorati *unc. ii.*  
Sp. sal. volat. ammoniac.  
*semunciam. M.*43. MAGNESIA ALBA. *Pharm. Edin.*Dosis a *drachm. i.* ad *drachm. ii.*—  
Pro cathartico leni et utili, valente  
acido stomachi indigeno.

## 44. MUCILAGO GUMMI ARABICI.

REC. Gum. Arabic. *unc. iv.*  
Aque fontane *unc. x. M. s. a.*45. \*OLEUM RICINI, *Emptitium*.

## 46. PILULÆ ALOETICÆ.

REC. Aloës succotrin.  
Saponis Hispan. ana. *P. Æ.*  
Syrupi *q. s.*Dosis a *gr. x.* ad *gr. xxv.*

## 47. PILULÆ AMMONIACÆ.

REC. Gum. Ammoniac. *unc. ii.*  
Saponis Hispan. *unc. i.*  
Balsam. capivi *q. s. M.*Dosis a *gr. x.* ad *gr. xv.* ter die.48. PILULÆ ANTIMONIALES cum  
MERCURIO.REC. Tartar. emetie. *drachm. i.*  
Calomel. ppt. *drachm. ii.*  
Syrupi *q. s.*

Formetur massa in pilulas 120.

Dosis *i. omni nocte; vel bis terve die.*

## 49. PILULÆ CALOMELANÆ.

REC. Calomel. ppt. *scrupul. i.*  
Miccæ panis *scrupul. ii.*  
Syrupi *q. s.*

Formetur massa in pilulas 20.

Dosis *i. ii. vel iii. omni nocte, vel  
bis die.*

## 50. PILULÆ CHALYBEATÆ.

REC. Sal. martiscalcinati *drachm. i.*  
Terebinthinæ venetæ *drachm.  
iss.*Pulv. gum. myrrh. *q. s.*

Formetur massa in pilulas 60.

Dosis ab *i. ad iii. ter die.*

## 51. PILULÆ ex HYDRARGYRO.

REC. Hydrargyri *drachm. i.*  
Mellis *drachm. i.*Tere simul in mortario marmoreo ad  
perfectam globulorum extincti-  
onem;

Dein adde

Miccæ panis *q. s.*

Formetur massa in pilulas 60.

Dosis *i. vel ii. mane, et ii. vel iii.  
vespere, cum decocto rad. sarsa-  
parillæ—ad lueni veneream.*52. PILULÆ e JALAPIO cum MER-  
CURIO.REC. Pulv. rad. jalapii *semunciam.*  
Calomel. ppt. *drachm. i.*  
Syrupi *q. s. M.*Dosis a *scrupul. i.* ad *scrupul. ii.*

## 53. PILULÆ e SENEKÆ.

REC. Pulv. rad. senekæ *scrupul. i.*  
Saponis Hispan. *semunciam.  
M.*Dosis a *gr. x.* ad *gr. xv.* 6tis die.Ad calculum—vel ad febres inter-  
mittentes pertinaciores.54. \*PILULÆ ex EXTRACTO MYRO-  
BALANI. (a)REC. Corticis, vel radicis myro-  
balani contus. *q. s.*  
Aque fontane *q. s.*Coque ut fiat decoctum fortius, et  
cola: Deinde per evaporationem  
leni calore peractam, moresolito fiat  
*extractum molle*; ex quo formentur  
pilulæ *gr. v.*Dosis a *ii. ad v.*—Pro cathartico leni,  
grato et efficaci; vi quoque tonicâ  
pollenti.

## 55. PILULÆ e RHÆO.

REC. Pulv. rhæi *gr. xxv.*  
Pulv. aromatic. *gr. v. vel ol.  
cinnamom. gutt. i.*  
Syrupi. *q. s. M.*Pro unâ dosi—hora somni, vel mane  
sumenda.

## 56. PILULÆ FOETIDÆ cum ALOE.

REC. Gum. asæ foetid. *scrupul. i.*  
Aloës succotrin. *gr. v.*  
Mucilag. gum. arabic. *q. s.*

Formetur massa in pilulas 4.

Dosis a *ii. ad iv.*—Utenda in gravi  
stomachi flatulentia cum alvi con-  
stipatione.(a) *Anglicæ* WHITE WALNUT, sive  
BUTTER-NUT.

stipatione, quæ aliquando in febre malignâ et castrensi occurrit, ad flatum deorsum expellendum.

57. PILULÆ OPIATÆ.

*REC.* Opii puri *scrupul.* i.  
Saponis Hispan. *drachm.* i. M.  
Formetur massa in pilulas 20.  
Dosis i. vel ii. hora somni.

58. PILULÆ PICEÆ.

*REC.* Piceis liquidæ q. v.  
Pulv. cascarillæ q. s. M. s. a.  
Dosis *gr.* xv. vel *scrupul.* i. ter die.

59. PILULÆ SAPONACEÆ cum RHEO.

*REC.* Saponis Hispan. *drachm.* vi.  
Pulvis rhæi *drachm.* ii.  
Syrupi q. s. M.  
Dosis a *scrupul.* i. ad *scrupul.* ii. bis terve die.

60. PILULÆ SCILLITICÆ.

*REC.* Pilul. ammoniac. *unc.* i.  
Pulv. scillæ aridæ *drachm.* iss.  
M.  
Dosis *gr.* x. vel *gr.* xv. ter die.

61. \*PULVIS AROMATICUS.

*REC.* Canellæ albæ.  
Rad. zingiber. ana P. Æ. M.  
Fiat pulvis.  
Dosis a *gr.* v. ad *scrupul.* i.

62. \*PULVIS ALUMINOSUS.

*REC.* Alumi. crudi.  
Terre japonicæ, ana P. Æ. M.  
Dosis a *gr.* viii. ad *drachm.* ss.

63. PULVIS ANTIMONIALIS.

*REC.* Tartar. emetic. *drachm.* i.  
Cretæ ppt. *unc.* i. M.  
Dosis a *gr.* x. ad *scrupul.* i. pro emetico; vel a *gr.* ii. ad *gr.* viii. 3tia vel 4ta quaque hora, pro diaphoretico.

64. PULVIS ANTIMONIALIS NITROSUS.

*REC.* Tartar. emetic. *gr.* ii.  
Salis nitri *drachm.* iii. M.  
Dosis a *gr.* xv. ad *drachm.* ss. 2da vel 3tia quaque hora.

65. Fit etiam cum OPIO, addendo

Gum. opii *gr.* ii.  
Eodem modo sumendus.

66. PULVIS CAMPHORATUS NITROSUS.

*REC.* Camphor. *drachm.* ss.  
Sal. nitri *drachm.* ii. M.  
Dosis a *gr.* xv. ad *drachm.* ss. 2da vel 3tia quaque hora.

67. Fit etiam cum OPIO, addendo

Gum. opii *gr.* ii.  
Eodem modo sumendus.

68. \*PULVIS CORTICIS PERUVIANI.

Dosis a *drachm.* ss. ad *drachm.* i. quaque vel 2da quaque hora.

69. PULVIS CORTICIS cum SERPENTARIA.

*REC.* Pulv. cort. Peruvian. *unc.* i.  
Pulv. rad. serpentar. *drachm.* ii. M.  
Dosis *drachm.* ss. quaque, vel 2da quaque hora.

70. PULVIS CORTICIS cum OPIO.

*REC.* Pulv. cort. Peruvian. *unc.* i.  
Laudani liquidî *gutt.* xxx.  
Terantur simul in mortario ut intimè misceantur.  
Dosis *drachm.* ss. quaque, vel 2da quaque hora.

71. PULVIS JALAPII cum CREMORE TARTARI.

*REC.* Pulv. jalapii *drachm.* i.  
Cremor. tartari *semunciam.* M.  
Dosis *scrupul.* i. 2da vel 4ta quaque hora, ut alvus leniter moveatur.

72. PULVIS GUAIACINI ANTIMONIALIS.

*REC.* Gum. guaiaci *drachm.* ii.  
Camphoræ *drachm.* ss.  
Tartari emetic. *gr.* iss. M.  
Dosis a *gr.* xv. ad *gr.* xxv. ter die.

73. PULVIS GUAIACINI NITROSUS.

*REC.* Gum. guaiaci *drachm.* i.  
Sal. nitri *drachm.* ii. M.  
Dosis a *scrupul.* i. ad ii. ter quaterve die.

74. PULVIS NITROSUS.

Est sal nitri in pulverem reductus.  
Dosis a *scrupul.* i. ad ii. 2da quaque hora.



## 75. \*PULVIS IPECACUANHÆ.

Dosis *gr.* xv. pro emetico :— vel *gr.* i. 4ta quaque hora, ad diarrhœam.

## 76. PULVIS IPECACUANHÆ cum OPIO.

*REC.* Pulv. Ipecacuanhæ *scrupul.* i.  
Gum. opii *gr.* v.  
Cretæ ppt. *drachm.* ii. Misce intimè.

Dosis a *gr.* x. ad *scrupul.* i. ter die, ad diarrhœam;— vel *drachm.* ss. hora somni, ut eliciatur sudor.

## 77. PULVIS SCILLITICUS NITROSUS.

*REC.* Pulv. scillæ aridæ *drachm.* i.  
Salis nitri *drachm.* iiss.  
Piperis Jamaicensis *drachm.* ss. M.

Dosis a *gr.* v. ad *gr.* xv. ter quaterve die.

## 78. SOLUTIO EMETICA.

*REC.* Tartari emetic. *gr.* v.  
Aque fontanæ *unc.* v. Fiat solutio.

Dosis *unc.* ss. quaque semihora ad vomitum.

## 79. SOLUTIO CATHARTICA.

*REC.* Sal. cathartic. amar.  
vel Glauberi *unc.* i.  
Mannæ opt. *unc.* ss. Solve in  
Aque calidæ *unc.* iv. et cola.  
Pro una dosi, duabus haustibus inter-  
vallo semihore sumenda.

## 80. SOLUTIO MERCURII CORROSIVI SUBLIMATI.

*REC.* Mercurii corros. sublimat. *gr.* xvi.  
Aque fontanæ *lib.* i. M.

Dosis

Dosis a *drachm.* ii. ad *semunciam*, mane et vespere.  
Utilis est etiam pro lotione phage-  
dænicâ.

## 81. \*TINCTURA CORTICIS PERUV.

*REC.* Pulv. cort. Peruvian. *unc.* ii.  
Cort. aurantiorum contus. *unc.* iss.

Rad. serpentariæ contus. *semunciam*.

Spiritus Jamaicensis *lib.* iss.

Infunde per 4 dies, et cola.

Dosis a *drachm.* i. ad *semunciam* bis, ter, quaterve die.

## 82. \*TINCTURA OPII, vulgo LAUDANUM LIQUIDUM.

*REC.* Gum. opii *unc.* ii.  
Piperis Jamaicensis *drachm.* ii.

Spiritus vini tenuis *lib.* iss.

Digere leni colore, et cola.

## 83. \*VINUM ANTIMONIALE.

*REC.* Vitri antimonii *unc.* iv.  
Teratur in mortario vitreo ut fiat pulvis; cui affunde  
Vini Maderensis *lib.* ii.

Digere leni calore per decem dies; dein per chartam cola.

Dosis a *semuncia* ad *unc.* i. pro emetico; vel a *gutt.* xx. ad *gutt.* xl. 2da quaque hora, pro diaphoretico— ad febres, &c.

84. \*SYRUPUS SACCHARI. *Syrupus Communis, Pharm. Edin.*

Vel, ejus loco uti possit syrupus empyreumaticus, ex insulis emptitiis, molasses vulgo dictus.

PARS

PARS II.

MEDICAMENTA EXTERNA, seu  
CHIRURGICA.

1. \*ACETUM LITHARGYRITES, vulgo  
EXTRACTUM SATURNI.

*REC.* Lithargyri levigati *lib.* i.  
Aceti vinosi optimi *lib.* iv.  
Digerantur per aliquod tempus; dein  
coquendo et commovendo, quan-  
tum fieri possit, solvatur lithargy-  
rus, et continuetur coctio donec ace-  
tum syrupi spissitudinem habeat:  
Hoc effuso eodem modo repeti possit  
operatio, si lithargyro ad fundum  
manenti novum pro portione appo-  
natur acetum.

2. AQUA SATURNINA.

*REC.* Aceti lithargyrits *drachm.* ii.  
Aque fontane *lib.* i. M.  
Utilis est pro lotione—ad intertrigi-  
nem seu inflammationem externam  
(*phlegmon*); in componendis cata-  
plasmatibus antiphlogisticis;—pro  
collyrio, in quibusdam ophthal-  
miis; et pro injectione (nonnun-  
quam sed cautè usurpanda) in stilli-  
cidiis.

3. \*CAUSTICUM LUNARE, *Pharm.*  
*Lond.*

4. \*LAPIS INFERNALIS, *Pharm.*  
*Lond.*

5. \*MERCURIUS PRÆCIPITATUS RU-  
BER, *Pharm. Lond.*

6. LINTEUM PRÆPARATUM.

*REC.* Vitrioli Cerulei *drachm.* i.  
Aque fontane *unc.* i. M.  
Fiat solutio, cui immergatur linteam  
more solito carptum, ut de toto  
mafeiat; seponatur super mun-  
dam tabulam donec aridum sit;  
dein servetur pro usu.

7. \*TINC-

7. \*TINCTURA MYRRHÆ et ALOES.  
*Pharm. Lond.*

8. \*EMPLASTRUM COMMUNE.

*REC.* Lithargyri *lib.* iii.  
Ol. olivarum *lib.* vi. Misce et  
coque ut fiat emplas-  
trum, s. a.

9 \*EMPLASTRUM ADHESIVUM.

*REC.* Emplast. communis *lib.* ii.  
Picis Burgundicæ *lib.* i.  
Liquefiant simul ut fiat emplastrum.

10. \*UNGUENTUM BASILICUM FLA-  
VUM, *Pharm. Edin.*

11. \*UNGUENTUM e Lapide CALA-  
MINARI, *Pharm. Edin.*

12. \*UNGUENTUM CEREUM.  
*REC.* Olei Olivarum *lib.* i.  
Cere flavæ *unc.* iv. M. s. a.

13. \*UNGUENTUM e PRÆCIPITATO  
RUBRO.

*REC.* Unguenti basilic. flav. *lib.* i.  
Mercurii præcipitati rubri  
*drachm.* v.  
Misce s. a.

14. \*UNGUENTUM MERCURIALE.

*REC.* Hydrargyri *lib.* i.  
Sevi ovilli, vel bovilli, *lib.* i.  
Axungie porcine *lib.* iii.  
Misce simul terendo in mortario ut  
fiat unguentum ceruleum, s. a.

15. UNGUENTUM SATURNINUM.

*REC.* Unguenti cerei *lib.* i.  
Sacchari saturni *unc.* i. M. s. a.

16. \*UNGUENTUM SULPHURATUM.

*REC.* Sulphuris triti *lib.* i.  
Axungie porcine *lib.* ii. M. s. a.

FINIS.

## VARIETIES.

WHITE'S COUGH SYRUP.—Syr. tolutani ʒij; syr. scillae comp. ʒvj; syr. ipecacuanhæ ʒvj; glycerini ʒiv; tinct. lobeliæ ʒvj; tinct. opii camph. ʒvj; extr. pilocarpi fluid. ʒij; ammonii chlorid. ʒi. M. Take a teaspoonful three times during the day, and every hour or two before going to bed.—*Med. World*.

SUBSTITUTE FOR MERCURIAL OINTMENT.—Vomacka gives the following directions for its preparation: One part of soft and perfectly neutral potash soap is mixed with a little glycerin in a glass mortar, and one part of mercury is added with constant trituration. When no globules of mercury are any longer visible, add two parts more of potash soap to make four parts. It may be scented with lavender or other essential oil.—*Med. and Surg. Reporter*, May 31.

AN INHALATION FOR CATARRH, CORYZA, ASTHMA, ETC.—M. St. Martin recommends this formula in the "Jour. de Med. Paris." Acidi carbolici 5 parts; ammon. pur. liq. 7 parts; aque dest. 10 parts; alcohol 15 parts. Soak some cotton wool with this mixture, and breathe this vapor from a wide-mouthed bottle.—*Amer. Med. Digest*, May 15.

CHLORAL AS A PURGATIVE.—In the "Gazetta Medica Italiana," Provincie Venete, Dr. Bonatti speaks highly of the use of hydrate of chloral, in doses of 2 to 3 Gm. (30-45 gr.), in a draught of senna, as a purgative in obstinate constipation of the insane, after croton oil and other cathartics had been used without avail.—*New York Medical Journal*.

THE DANGER OF CHLORATE OF POTASSIUM indiscriminately administered is dwelt upon editorially in the "Indiana Medical Journal," and cases of poisoning and deaths are quoted as a result of its use. The editor very properly says: "Physicians should correct the very prevalent error in the minds of the people that it is a harmless agent." He might have added that physicians should correct this error in their own minds. A mistaken idea of its physiological action has made it a fashionable agent in zymotic diseases, especially diphtheria and scarlatina, and we have no hesitation in asserting that death in these two diseases has not infrequently been caused by its excessive use. The routine prescription of tincture of chloride of iron, and chlorate of potassium in the above mentioned diseases is not only unscientific, but absolutely harmful in a high degree.—*Weekly Med. Review*, Aug. 2.

NUX VOMICA AS A GALACTAGOGUE.—Dr. Posada Arango speaks very highly of the good effect of nux vomica as a stimulant to the secretion of milk. He gives ten drops of the tincture three times a day, and explains its galactagogue properties by its action on the mammary gland, exciting it to secretion, and by its stimulating action on the stomach facilitating digestion. He recommends strychnine in recent cases of complete suppression of the secretion.—*Lond. Med. Record*, *Cinc. Lancet and Clinic*.

## EDITORIAL DEPARTMENT.

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OPPOSITION TO THE PHILADELPHIA PHARMACY LAW.—Some years ago a violent but unsuccessful onslaught was made by certain individuals against the pharmacy law of 1872, the principal feature being the bold assertion—without proof—that the law was gotten up for the sole benefit of the Philadelphia College of Pharmacy; the circular that was then issued, was last year used by the same anonymous parties, to help defeat the State Pharmacy Bill then pending before the Legislature. At the present time a circular without any signature is being distributed, which is exceedingly solicitous about the welfare of College, in expressing the fear that this institution would be injured by the continued enforcement of the law in question. Now which of the two great unknown is correct in his assertions? It is not worth the while to follow and refute the crude statements advanced, but for the benefit of those who are battling against the so-called “cutters,” it should be said that these individuals have sprung up “under the incubus of the pharmacy law,”—how? the circular unfortunately omits to state. If as the unknown individual states, the pharmacy law is unconstitutional, the easiest way to get rid of it would be to contest it before the courts, which, however, was to some extent, unsuccessfully tried about ten years ago.

It is not unlikely that the present circular has been written rather in opposition to the new Pharmacy Board, than to the law; but as long as the Board, which consists of Messrs. J. J. Ottinger, J. L. Supplee, H. P. John, J. F. Hays, *Secretary*, and Dr. L. Wolff, *President*, continue to enforce the law according to its letter and its intentions, we presume it must be considered far easier to repeal the law, than to overthrow the legal status of the Board, which will probably sooner or later be superseded by a State Board of Pharmacy.

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POISONS IN MEDICINES.—A curious case of poisoning, resulting in the death of one person and the narrow escape of four others, occurred in Philadelphia, August 1, merely as the result of “a good joke.” A box containing about 50 or 60 granules of strychnine,  $\frac{1}{20}$  grain each, was passed around at the supper table each one of the five persons taking according to their foolhardy fancy, with the result stated. It appears that a physician had prescribed these granules for a former boarder, who on removing, left the box behind with what remained of the one hundred granules originally prescribed. The box was properly labeled, though the word poison did not appear on the lid.

We do not regard it as judicious to prescribe large quantities of deadly poisons; even in case they have to be used for a certain period, it would certainly be better to renew the medicine frequently in small quantities than to run the risk of accident or as in this case, of senseless rashness or practical joking, which is possible, in case the dangerous medicine be pleasant in taste and of inviting appearance, or even harmless looking like sugar granules.

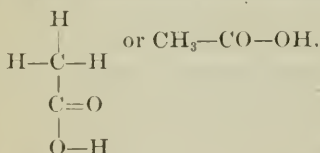


## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

*Grundzüge der Organischen Chemie.* Von Dr. Aug. Laubenheimer, Professor. Heidelberg: Carl Winter's Universitätsbuchhandlung, 1884. 12mo, pp. 876.

*Fundamental Traits of Organic Chemistry.*

In the introductory portion the author defines the field of the so-called organic chemistry, or more properly of the chemistry of the carbon compounds, and describes the methods of ultimate analysis, of ascertaining the molecular formula and of determining vapor densities. The difference between empirical, rational and structural formulas is next explained, acetic acid being used as an example, and the reasons given for writing the empirical formula  $C_2H_4O_2$ , the rational formulas  $C_2H_3O_2.H$ , or  $C_2H_3O.OH$ , or  $CH_3.CO_2H$ , and the structural formulas



After discussing the theory of the structure of the carbon compounds, isomerism, polymerism, and homologues, a chapter on terminology and classification gives us an insight into the general arrangement of the work. The carbon compounds may be viewed in regard to their chemical functions or with reference to their genetic relations; the latter would necessitate an arrangement by which the simplest compounds, hydrocarbons, are gradually converted, by substitution or addition, into the more complicated compounds. But whatever system be adopted the position of any one compound is determined by the two factors mentioned, its chemical function and its genetic relation. As an introduction into organic chemistry the author prefers a system in which the first consideration predominates, and whereby groups of the carbon compounds are characterized in their various general relations.

The hydrocarbons form two natural classes, the so-called fatty group and the benzol group with their derivatives, containing halogens, oxygen, nitrogen, phosphorus, arsenic, boron and other elements. The oxygen compounds are again classified as alcohols, ethers, aldehyds, ketones, carbonacids, esters or compound ethers and anhydrides; and the nitrogen compounds form the nitro group, nitroso-group, amines and amides.

To show the advantage of such a system for the beginner we may refer to the hydroxyl-derivatives of the methane series which are grouped as mono-, di-, tri-, tetra- and hexa-hydric alcohols, the first one comprising those, to which the ordinary alcohol belongs. In this group is first explained the difference in constitution between the primary, secondary and tertiary alcohols; next the production of the alcohols and their isomers; the transformation of primary into secondary and tertiary alcohols, and of polyhydric into monohydric alcohols; the general properties and the behavior to

various chemical agents. The alcohols of this group are then enumerated in a table giving the structural formulas, production and most characteristic properties; this table opens with methyl alcohol or wood spirit, boiling point  $66^{\circ}\text{C}$ ., and closes with myricyl alcohol (from beeswax), melting point  $88^{\circ}\text{C}$ .

All the different groups are considered in a similar manner, and it will be observed that this arrangement is particularly adapted for the general characterization of analogous compounds, and for the study of the general processes by which they may be obtained or converted into compounds of a different order. Those bodies, the constitution of which has been imperfectly ascertained, or is entirely unknown, are grouped together at the end of the work, where we find the alkaloids following the group of pyridine and chinoline, and subsequently terpenes and camphors, glucosides, bitter principles, coloring matters and protein compounds of both the vegetable and animal kingdoms. Detailed descriptions are in all cases omitted, only the most characteristic properties being very briefly mentioned, and the study of color, shape, odor, taste, etc., etc., is very properly left for individual examination of suitable specimens with or without the aid of works of reference.

From the foregoing the scope of the "Grundzüge" will be readily understood. Intended for the use of the student, the immense mass of material is presented, systematically arranged, in such a manner that the general features of cause and effect are displayed, and specializing is confined mainly to few distinctive points. Comprehensiveness and perspicuity throughout the work are deserving of commendation, and especially is this the case with the theoretical themes, which in our opinion, are deduced and explained in a happy and attractive manner, that cannot fail to enlist the attention of the student. The book seems large for a work intended for aiding the beginner in mastering the principles of organic chemistry, and in securing, besides the solid foundation, a secure framework for further special study; but on carefully examining the work it cannot be charged with undue prolixity, and it would be difficult to point out any portion of it that could be advantageously shortened without detriment to the general plan. It should however be stated that the graphic formulas and syllabi of the compounds belonging to the various groups require considerable space. A limited number of wood-cuts has been used in the introductory part of the work. Paper and topography leave nothing to desire.

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*The National Dispensatory.* By Prof. Stillé, M. D., LL.D., and Prof. John M. Maisch, Phar.D. Third edition thoroughly revised, with numerous additions. With 311 illustrations. Philadelphia: Henry C. Lea's Son & Co., 1884. Large 8vo, pp. 1755.

This work has been issued in August. For our next number we hope to receive a critical review of the book, written by a well known pharmacist.

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*The Druggists' Circular and Chemical Gazette.* New York.

We regret to learn that Mr. J. L. A. Creuse has been compelled, by reason of continued illness, to resign his position as editor; in July last he sailed for France, where we hope he may enjoy complete recovery. The editorial chair is now occupied by Professor H. B. Parsons, than whom a better selection it would have been difficult to make.

*The Student's Guide to Systematic Botany*, including the classification of plants and descriptive botany. By Robert Bentley, F.L.S., M.R.C.S. Eng., etc. London: J. & A. Churchill, 1884. 12mo. Pp. 178.

This little work contains the principal natural orders of the British flora yielding medicinal plants, and arranged according to De Candolle's system somewhat modified. These orders and their subdivisions are characterized in the lucid and careful style to which we are accustomed in the author's writings; the characters are fully illustrated and attention is directed to plants presenting these characters. The second part, about one-fourth of the book, is devoted to descriptive botany, explaining the manner in which the student should proceed to examine plants and giving examples of descriptions of 19 familiar medicinal plants, belonging to as many different natural orders. The little volume will doubtless prove of great use to British students entering upon the practical study of botany.

*A Short Text-book of Inorganic Chemistry*. By Dr. Hermann Kolbe, Professor of Chemistry in the University of Leipzig. Translated and edited by P. S. Humpidge, Ph.D., B.Sc. (London), etc. With a colored table of spectra and numerous wood engravings. New York: John Wiley & Sons, 1884. Pp. 606. Price \$2.50 Philadelphia: Porter & Coates.

That Kolbe's work is a good one is saying about as little as possible of a book written by one of the most prominent chemists, whose critical mind is well known. The author's aim is expressed in the preface as being to give an idea of chemical processes and of the most important chemical theories without burdening the memory with a large number of mere facts: to blend them together into one continuous narrative, and thus to prepare students to acquire an accurate knowledge of chemistry by their own practical work. This is what the author insists on, continued practice and thus to learn by clear perception and reflection. The translator and editor has done well his part of the labor, and the external getting up of the book is also creditable. The English-speaking student of chemistry has thus offered to him another good elementary work in addition to those previously placed in his hands.

*The Extra Pharmacopœia of Unofficial Drugs and Chemical Preparations*. By Wm. Martindale, F.C.S.; with reference to their use, etc., by W. W. Westcott, M.B. Third edition. London: H. K. Lewis, 1884. 16mo, pp. 330.

The second edition was noticed on p. 127 of our present volume, and differs but little from the book now before us; yet the latter contains a number of new formulas and references.

*Auscultation, Percussion and Urinalysis*. An epitome of the physical signs of the heart, lung, liver, kidney and spleen in health and disease. Edited by Prof. C. Henry Leonard, A.M., M.D. Detroit, Mich.: Illustrated. Med. Journal Co. 12mo, pp. 166. Price \$1.

It is illustrated with about 40 wood-cuts.

# THE AMERICAN JOURNAL OF PHARMACY.

OCTOBER, 1884.

## ESTIMATION OF NICOTINE.

BY EMIL SCHEFFER.

Several methods have been published to estimate the amount of nicotine in tobacco, but for its estimation in different preparations of tobacco we have only the volumetric test with Mayer's solution, which, although not quite perfect, yet gives approximately correct results.

The writer had lately to make a large number of estimations of nicotine from tobacco extracts, which he executed according to Dragendorff's method.<sup>1</sup>

One of the greatest obstacles for correct work is the circumstance that a more dilute solution of nicotine requires a larger proportion of Mayer's solution than a stronger solution. To get if possibly a clue to this anomaly, I decided to prepare pure nicotine, and make experiments with it.

Pure nicotine was prepared by distilling extract of tobacco with caustic soda; the distillate was slightly supersaturated with sulphuric acid then evaporated and treated with absolute alcohol to separate the sulphate of ammonium. The alcoholic solution of sulphate of nicotine was evaporated on a water-bath to drive off the alcohol; the watery solution of residue was mixed with ether, and concentrated solution of caustic soda added. After repeated strong agitation the mixture was allowed to separate; the ethereal solution was drawn off with a pipette into a tared beaker, and the ether allowed to evaporate spontaneously. When the odor of ether had disappeared, the remaining liquid, which had a slight yellowish tint, was weighed, dissolved in water, and the amount of nicotine in it ascertained with normal volumetric solutions of hydrochloric and sulphuric acids.

The neutralized solutions were then, with the addition of distilled water, brought to a certain volume.

<sup>1</sup> Die chemische Werthbestimmung einiger stark wirkenden Drogen. Von Dr. G. Dragendorff. St. Petersburg, 1874.



A. 4.387 residue of ethereal extraction required 24.3 cc. of normal HCl, corresponding to 3.936 pure nicotine.

The neutralized solution was diluted to 500 cc. of 0.787 per cent. nicotine.

B. 8.793 residue of ethereal extraction were dissolved in water to measure 250 cc.; of these 20 cc. required for neutralization 3.56 normal oxalic acid.

a. 80 cc. required 14.4 cc. of normal HCl; were diluted to 250 cc.

b. 80 cc. required 14.4 cc. of normal  $\text{H}_2\text{SO}_4$ ; were diluted to 250 cc.

c. 60 cc. required 10.8 cc. of normal  $\text{H}_2\text{SO}_4$ ; were also brought to 250 cc.

According to the quantity of  $\text{H}_2\text{SO}_4$  needed for the neutralization of 80 cc. of solution B, the 8.793 of ethereal residue correspond to 7.290 nicotine, and B. a. contains 2.333 nicotine, or 0.9332 per cent.; <sup>1</sup>B. b. contains 2.333 nicotine, or 0.9332 per cent.; B. c. contains 1.749 nicotine, or 0.6996 per cent.

The tests were made with Mayer's solution, which was prepared from perfectly pure mercuric chloride and potassium iodide, so that 1 cc. contained exactly 0.01354  $\text{HgCl}_2$  and 0.0498 KI.

Taking the equivalent for nicotine as 162, and supposing that the precipitate obtained was composed of  $\text{HgI}_2 \cdot \text{C}_{10}\text{H}_{14}\text{N}_2(\text{HI})_2$ , and has therefore the molecular weight of 872, it was found that Dragendorff gives the amount of nicotine that is indicated by 1 cc. of M. S. too low, and that it ought to be twice as large, that is, instead of 0.00405, it ought to be 0.0081.

The writer was first led to these investigations by the statement of Dragendorff, that only one-half of M. S. used, was used for the formation of the precipitate. Mr. Zinnofsky, who made the tests, has ascertained the amount of mercury in the precipitate, judging by this of the composition of the precipitate; but he has not weighed (at least nothing is said about) the precipitate, and then he has omitted to prove the presence of nicotine in the liquid after M. S. has ceased to give precipitate.

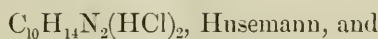
Then, also, by taking the composition of hydrochloride of nicotine as  $\text{C}_{10}\text{H}_{14}\text{N}_2(\text{HCl})_2$ , another reason is given for obtaining the coefficient of nicotine too small.

<sup>1</sup>10 cc. were allowed to evaporate spontaneously under a desiccator; the residue weighed 0.123.

0.09332 nicotine correspond to 0.1215 sulphate of nicotine.

Why it is that all our text-books give the composition of hydrochloride of nicotine as  $C_{10}H_{14}N_2(HCl)_2$ , while the sulphate, they say, consists of 1 equivalent of nicotine and 1 equivalent of sulphuric acid, is difficult to understand, as the same quantity of nicotine which is neutralized by  $49 H_2SO_4$  is also neutralized by  $36.4 HCl$ .

Gmelin has the composition of sulphate of nicotine,  $C_{20}H_{14}N_2 \cdot HO \cdot SO_3$  (old notation), and Husemann says that 49 sulphuric acid neutralizes 162 nicotine, and both authors give for the hydrochloride:



Now for the proof of my assertions.

The precipitate obtained was collected on a tared filter, washed and dried under a bell glass above sulphuric acid, and the amount of Hg and I in it ascertained. For this purpose a certain quantity of the dried precipitate was placed in a beaker and ammonia water added to it, by which the yellowish precipitate was transformed into a fine white powder. When the transformation was completed, freshly prepared ammonium sulphide was added, whereby the mercury was separated as  $HgS$ .

After the white precipitate had disappeared, and was entirely decomposed, the precipitate of  $HgS$  was collected on a tared filter, washed, dried and weighed. The liquid resulting from the precipitate by  $Am_2S$  with the wash water was heated on the water-bath until all odor of  $H_2S$  had disappeared, then slightly acidulated with sulphuric acid, and  $AgNO_3$  added as long as a precipitate was formed.

After the precipitate had subsided, the liquid was decanted from the precipitate, and filtered through a tared filter; to the moist precipitate of  $AgI$  in the beaker, ammonia water was added, and macerated over night, and the next morning the  $AgI$  collected on the same filter, thoroughly washed, and, having become air dry, was heated in a drying oven at  $212^\circ F$ . until the weight kept constant.

The ammoniacal liquid running off from the  $AgI$  did not become turbid on addition of  $HNO_3$ , and thereby the absence of chlorine in the original precipitate was confirmed.

To control the result of examination of the precipitate by M. S., the liquid obtained was also examined; the mercury was precipitated by  $H_2S$ , and the precipitate of  $HgS$  washed and dried. The liquid,

plus washings, was heated on the water-bath until  $H_2S$  was driven off, then pure  $Na_2CO_3$  added, evaporated to dryness, and strongly heated. Dissolved in water, it was slightly acidulated with  $H_2SO_4$ , and the amount of I ascertained volumetrically with  $\frac{1}{10}$  normal solution of  $HgCl_2$ . The addition of  $Na_2CO_3$  to the acid solution is necessary to drive off the nicotine in the solution.

In trying to estimate the I in this solution with  $HgCl_2$  before use of carbonate of sodium was made, at first a resinous yellow precipitate was obtained similar to the resinous precipitate in the original tests. Other experiments convinced me that nicotine was present, particularly the strong odor after addition of carbonate of sodium and the alkalinity of the vapors.

On making the tests with M. S. it is of importance to avoid and prevent the precipitate from becoming resinous; the precipitate is not uniform in its composition unless certain precautions are observed; when a resinous precipitate is formed, a larger quantity of M. S. is necessary to finish the test.

As the object is to obtain a precipitate of definite composition— $HgI_2 \cdot C_{10}H_{14}N_2(HI)_2$ —the formation of any resinous precipitate must be avoided. To prevent this, at the beginning a large quantity of M. S. is added at once, and the resulting mixture is briskly stirred until a crystalline precipitate begins forming.

The quantity of acid added to the nicotine solution seems also to have influence; if it is small a resinous precipitate is more apt to be formed. One drop of strong hydrochloric acid for each 10 cc. of nicotine solution acts very well; more acid (2 or 3 drops for 10 cc.) did not seem to influence the quantity of M. S. required.

According to Dragendorff—

19.3 cc. of M. S. in A.	would indicate	0.07816	nicotine,
22.5 cc.       “       in B. a. & b.	“       “       “       “	0.091125	“
17.4 cc.       “       in B. c.	“       “       “       “	0.07047	“
and the precipitate in A. should amount to 0.4207			
“       “       in B. a. & b.	“       “       “       “	0.490	
“       “       in B. c.	“       “       “       “	0.380	

while there was obtained, respectively, 0.724, 0.866 and 0.645, or on an average 73 per cent more than Dragendorff accounts for.

	Volume of Nicotine Solution.	Amount of Nicotine.	Quantity of M.S. required.	Weight of Precipitate.	Liquid off Precipitate.	
					Amount of Hg as HgS.	Amount of I.
Hydrochloride of Nicotine.	A.					
	1. 40 cc.....	·3148	38·7 cc.	1·461	0·052	
	2. 40 cc.....	·3148	38·3 cc.	1·442	0·055	
	3. 20 cc.....	·1574	19·3 cc.	0·718	0·027	
	4. 20 cc.....	·1574	19·5 cc.			
	5. 20 cc.....	·1574	19·2 cc.			
	6. 20 cc.....	·1574	19·25 cc.	0·727	0·028	
	7. 20 cc.....	·1574	19·3 cc.	0·723	0·027	0·315
	8. 20 cc.....	·1574	19·25 cc.	0·718	0·027	
	Average for 20 cc. of Nicotine Solut.		19·3 cc.	0·724		
Sulphate of Nicotine.	B. a.					
	20 cc.....	·1866	22·6 cc.	0·862		
	20 cc.....	·1866	22·4 cc.			
	B. b.					
	1. 20 cc.....	·1866	22·6 cc.	0·870	0·026	
	2. 20 cc.....	·1866	22·7 cc.	0·871	0·028	0·352
	3. 20 cc.....	·1866	22·4 cc.	0·862		
	Average for 20 cc.....		22·5 cc.	0·866		
	B. c.					
	20 cc.....	·1398	17·4 cc.	0·645		

*Composition of Precipitate.*

1·000 of A. 2. yielded 0·270 HgS and 1·085 AgI = 0·586 I.

0·718 of A. 3. “ 0·197 HgS and 0·773 AgI = 0·418 I.

0·723 of A. 7. “ 0·197 HgS and 0·785 AgI = 0·424 I.

0·197 HgS correspond to 0·385 HgI<sub>2</sub> with 0·215 I.

0·385 HgI<sub>2</sub> deducted from the precipitate, that is from 0·723, leaves 0·338 for acid hydriodide nicotine.

0·215 I deducted from the entire amount of I found in precipitate, from 0·424, leaves 0·209 I, which is as HI in combination with nicotine.

0·723 precipitate give by calculation 0·376 HgI<sub>2</sub> and 0·347 C<sub>10</sub>H<sub>14</sub>N<sub>2</sub>(HI)<sub>2</sub> with 0·210 I.

0·755 of precipitate B. b. 2. yielded 0·205 HgS and 0·820 AgI, or



for 0.871 (the entire precipitate) 0.236 HgS and 0.945 AgI with 0.510 I.

0.236 HgS correspond to 0.461 HgI<sub>2</sub> with 0.258 I.

\* 0.461 HgI<sub>2</sub> deducted from the amount of precipitate, from 0.871, leave 0.410 for acid hydriodide nicotine.

0.258 I deducted from the entire amount of I found in precipitate, from 0.510 leave 0.252 I, which is as HI in combination with nicotine.

Calculation requires for 0.871 precipitate 0.4534 HgI<sub>2</sub> and 0.4176 and hydriodide of nicotine with 0.2537 I.

From these investigations it appears that the composition of the precipitate is HgI<sub>2</sub>.C<sub>10</sub>H<sub>14</sub>N<sub>2</sub>(HI)<sub>2</sub>.

The presence of nicotine in the liquid, filtered off the precipitate after M. S. has ceased to give a precipitate is evidence that a part of the combination formed is kept in solution, which is easily ascribed to the excess of potassium iodide in Mayer's solution. Dry precipitate, which is very little soluble in pure or acidulated water, dissolves to a greater extent when iodide potassium is added to the water.

But as with a certain quantity of M. S. a precipitate ceases to be produced by addition of more, we have a right to assume that the nicotine found in solution is in the same combination as in the precipitate, and from the quantity of mercury in solution the quantity of nicotine can be ascertained.

By calculating the combination in solution from the amount of HgS found, and adding the amount to the precipitate, we obtain nearly double the amount that Dragendorff claims to obtain.

The quantity of nicotine indicated by 1 cc. of Mayer's solution has to be taken therefore as 0.0081, or one-half equivalent.

From among the many perplexing and embarrassing results which were obtained, it is my purpose to mention only a few to prove the assertion that when a resinous precipitate is formed, more M. S. is required to finish the reaction.

20 cc. of A. required 22 cc. of M. S. when the precipitate was resinous at first.

20 cc. of B. c. required 25.7 cc. M. S., the precipitate having formed resinous except towards the last.

20 cc. of B. c. furnished a resinous precipitate until 23 cc. of M. S. were added; the liquid was then decanted and more M. S. added until it ceased to give precipitate; it required 3 cc. more.

0.690 of the concrete resin gave 0.200  $\text{HgS}$ , corresponding to 0.391  $\text{HgI}_2$ , an amount much larger than in the successful experiments.

To 20 cc. of B. c. were at first added 12 cc. of M. S.; the crystalline deep yellow precipitate was collected on a tared filter, washed and dried; to the liquid more M. S. was added until it ceased to give precipitate; 10.4 cc. were required. The second precipitate was also collected on a tared filter, washed and dried, and from the liquid the  $\text{Hg}$  was precipitated by  $\text{H}_2\text{S}$ , yielding 0.033  $\text{HgS}$ .

First precipitate weighed 0.482

Second " " 0.353

In regard to the circumstance that a more dilute solution of nicotine requires more M. S. than one of a certain concentration, it is my impression that it is owing principally to the formation of resinous precipitate, which is more apt to be formed in very dilute solutions. The resinous precipitate has a different composition from the regular crystalline precipitate, and contains proportionally a larger amount of  $\text{HgI}_2$ . Experiments made with dilute solutions of A. and B. showed that the more resinous precipitate is formed the more M. S. was required.

A solution for testing ought to contain at least 0.5 per cent. of nicotine to obtain correct results.

LOUISVILLE, KY., September, 1884.

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MENTHOL.—I think it was Mr. Malcolm Morris who, some time ago, spoke of the antiseptic use of menthol in ringworm of the scalp. I applied a solution in rectified spirit to the tinea tonsurans of a young friend in the winter of 1879, and cure resulted; and recently I have met with success in this disease from a pomade of menthol, iodoform and vaseline.

In facial neuralgia, in some forms of sciatica, in neuralgic headache (clavus) and in toothache, the most recent instance being in a severe case of a lady recovering from acute alcoholism, I have repeatedly found relief to follow within a few minutes of its application. The cones or sticks are useful for external application. Frequently, however, I use now the following formula: Menthol, 30 grains; and spirit of rosemary, rectified spirit, each two drachms; or compound spirit of lavender may be used instead of the rosemary for application to the cavity of a carious tooth. I have only taken it once internally myself, but never have prescribed it. This has, however, been done.—*Brit. Med. Jour.*; *Louisv. Med. News*.

## INFUSION OF DIGITALIS.

BY FRANK ELLIOTT VALENTINE, PH.G.

*From an Inaugural Essay.*

Prepared with tincture of cinnamon according to the formula of the U. S. P., 1870, a very unsatisfactory preparation was the result; the objection arising from the persistent precipitate, which made its appearance within a few hours, continued to form after filtration, and was not completed in the specimen under examination after a period of six weeks. Whether or not this precipitate contained any digitalin or any active principle of the drug has been the subject of some discussion (see paper by D. E. Prall, in "*Am. Jour. Phar.*," 1878, p. 422). By way of experiment the whole amount of precipitate from four pints of infusion was collected, dried and administered to an adult within a period of ten hours. The amount taken was not less than fifty grains, and was in a rather impure state, yet this quantity produced no other effect than a slight nausea; no reduction of the pulse nor any action whatever upon the heart being noticed.

A few drops of hydrochloric acid were added to two pints of another portion of the infusion; a copious precipitate was thrown down within two hours. This was collected and dried, and the entire quantity, about thirty grains, administered to an adult within a period of ten hours. No effect was noticed, the nausea of the former experiment being absent.

The conclusion arrived at as a result of these experiments coincides with that of others, viz., that the precipitate is due to the presence of cinnamon and is inert. In the opinion of the writer it consists of an altered form of tannic acid, thrown out from the cinnamon, and contains no digitalin nor any active principle of the digitalis. But the fact that the precipitate is inert, is no reason why its presence should be disregarded.

An improvement in the formula was attempted in the last revision of the Pharmacopœia by the substitution for tincture of cinnamon of the old formula, of sufficient amount of the bark to produce the proper aromatic effect. This change served only to lessen the amount of the precipitate, but failed to overcome the difficulty. It has been suggested by some to omit the cinnamon altogether or to replace it by the addition of a small quantity of oil of cinnamon. Yet, in the opinion

of the writer, a formula differing as slightly from the one already in use as is possible is to be preferred, and it is the object of this essay to furnish one which will produce a preparation free from precipitate and yet differ so slightly in taste and odor from the officinal one as to suit the most fastidious. This is accomplished by the addition of one ounce (15 parts) of glycerin to each pint (200 parts) of the infusion. According to this formula a preparation was made which showed no indication of any precipitation after a period of three weeks. The change of taste produced by the presence of the glycerin is slight and of such a nature as to render the preparation more agreeable than heretofore, and no exceptions to the use of it could justly be taken on these grounds, nor could any objectionable therapeutic effect possibly arise from its presence.

In the course of experiment an infusion was made to which a small quantity of solution of potash was added with a view of preventing precipitation. As far as this object was concerned it was quite successful, but objections to its use arise from the fact that a deep red color and a decided saponaceous taste are imparted to the liquid, effects which are objectionable.

## THE PRECIPITATE FROM THE TINCTURE OF SANGUINARIA.

BY WILLIAM JOHN MCCONN, PH.G.

*From an Inaugural Essay.*

Having observed that in quite a short time, precipitation takes place in the Tincture of Sanguinaria, and unable to find from the various works I have consulted that the nature of this precipitate has been determined;<sup>1</sup> I have undertaken its investigation, with a view of suggesting some means of preventing it. It is deposited on the sides and bottom of the shop tincture bottle, and is not perceptibly removed by the most violent agitation. It is of granular appearance and brownish-black color; when collected and dried it is in the form of a smooth powder of a reddish-brown color leaving a yellowish-brown stain on the skin, without perceptible odor and of slightly acrid taste; when seen under the microscope, it has the appearance of being massed with a rough somewhat granular surface.

<sup>1</sup> Mr F. L. Sloeum determined the presence of sanguinarine in this precipitate; see *Am. Jour. Phar.*, 1881, p. 277.



Chloroform being added to the precipitate quickly became of a dull red color which was deepened by the addition of acetic acid, this mixture on standing separated into two layers, both transparent, the upper of a pale straw, and the lower of a deep red color. Upon evaporating the upper layer, a resin-like mass remained, which was translucent, of a dark amber color, soluble in alcohol, also in water; was reddened on the addition of nitric acid, and on charring a black ash resulted. On evaporating the lower layer, a reddish-brown resin-like mass was obtained which was insoluble in ether, alcohol and water, both hot and cold, but readily soluble in chloroform; reddened by nitric acid, and on charring yielded a black ash.

The undissolved portion was treated with alcohol without perceptible change; the addition of ammonium hydrate immediately produced a deep red colored solution, still leaving a large percentage undissolved. This solution yielded upon evaporation a clear, deep red, liquid of syrupy consistence.

The insoluble portion upon incineration yielded a gray ash.

Another portion of the precipitate was then subjected to the action of ammonium hydrate, without any perceptible change, but upon the addition of alcohol a deep red colored solution was obtained, which upon filtering left a yellowish-brown residuum of a sparkling appearance.

The undissolved portion of this precipitate was treated with the above filtrate with the addition of citric acid and again filtered leaving a blackish precipitate on the filter; the filtrate on standing separated into two layers, and of a deep red color, the lower of a pale straw color. The former gave a copious precipitate upon the addition of auric chloride, but no change with platinic chloride; upon evaporation a reddish brown mass was obtained which assumed a decided yellow color, slowly changing to red upon the addition of nitric acid; this residue is perfectly soluble in water.

The straw-colored layer of the above solution was not inflammable and yielded a very small brown product on evaporation, which was changed to a reddish color on the addition of nitric acid, and was soluble in water.

The presence of alkaloid in the precipitate was established by the action of nitric acid and auric chloride, this precipitation is prevented by the presence of a citrate of an alkali and having made a number of tinctures with this end in view I would suggest the use of the citrate of potassium as having given the best results.

## ALOIN.

BY HENRY CHARLES PLENGE, PH.G.

*From an Inaugural Essay.*

The only published process which *à priori* seemed practicable for all varieties of aloes is that of Tilden, which was followed. 25 grams of aloes were dissolved in 250 cc. of boiling water acidulated with hydrochloric acid and allowed to cool. The liquid was then decanted from the precipitated resinous matter, evaporated to about 50 cc., and set aside two weeks for crystals to form. The liquid portion was poured off, the crystals were pressed between folds of bibulous paper to remove as much as possible of the adhering resin, and then purification by various means was tried.

The mixture of crystals and resin was dissolved in diluted alcohol, the solution filtered and set aside to crystallize. The crystals were still contaminated with a considerable amount of resinous matter. Other solvents were used, of which acetic ether proved to be the best. The resin is apparently more soluble in ether than the aloin, and when the impure aloin was treated with this solvent and allowed to stand, with occasional agitation, the liquid acquired a brown color, and the yellowish color of the crystals could be distinguished. The liquid was then quickly and carefully poured off and the crystals dried.

Five commercial varieties of aloes were experimented with: Socotrine, Barbadoes, Cape, Curaçao and Bonare. The two latter were very similar in appearance and yielded about the same amount of aloin. From Cape aloes no aloin was obtained.

In the first experiment Socotrine yielded 3 per cent. of aloin; in subsequent trials none was obtained. Barbadoes aloes, to which this process is specially adapted, averaged 9 per cent.; Curaçao averaged 7.5 per cent., and Bonare 7 per cent. The cause of variation in the yield of aloin from different portions of the same sample treated by the same process is evidently due to variation in the degree of heat used in evaporating the infusion and probably also to the length of time at which the heat was applied. By the use of a vacuum apparatus the yield would undoubtedly have been greater and the aloin of a better quality. The aloin finally obtained was not in distinct crystals but in small crystalline crusts.

Aloin was obtained from Socotrine aloes by the following process: One part of Socotrine aloes was digested in 3 parts of alcohol for 24

hours, then transferred to a water-bath and boiled for about two hours. After cooling, the liquid was poured off from the resin, filtered, placed in an open dish, loosely covered and set aside to crystallize. The crystals were then washed with a little alcohol and dried. The yield was about 10 per cent.

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## ANALYSIS BY CAPILLARITY.

BY HANS M. WILDER.

Prof. J. U. Lloyd's article in the September number reminds me of an article by Goppelsröder, in the "American Journal of Pharmacy" for 1863 (vol. xxxv, p. 178), wherein he shows that a mixture of several colors may very well be analyzed (so to speak) by means of blotting paper; the different colors spreading out unequally—sufficiently so as to separate distinctly. In the same article he refers to an earlier paper by Schönbein, "on the different heights to which bodies in solution rise by immersing one end of a strip of blotting paper."

Leroy, "American Journal of Pharmacy" for 1861 (vol. xxxiii, p. 93), proposes the same means for examining various compound tinctures, comparing them to a standard.

Prof. Lloyd mentions the height to which chloride of sodium in solution rises (some six feet). In this connection it will be interesting to read a paper by Frankenheim ("Poggendorff's Annalen," lxx, p. 515; condensed in Watt's Dictionary, p. 741), on the height to which different liquids rise.

Musculus (Watt's Dictionary, 1st Suppl., p. 393, and *in extenso* in "Phar. Jour. and Transactions" [2], ix, p. 171) recommends capillarity as a delicate analytical method for the detection of several substances, especially of alcohol and acetic acid in aqueous solutions.

The capillary power of saline solutions is discussed by Buliginski ("Poggendorff's Annalen," cxxxiv, p. 440; condensed in Watt's Dictionary, 2d Suppl., p. 244).

PHILADELPHIA, September 11th, 1884.

NOTE BY THE EDITOR.—The results of Schönbein's experiments, referred to above, are thus briefly summarized in "Jahresbericht der Chemie," 1861, p. 63: "Experiments with strips of filtering paper, dipping with the lower end into dilute solutions of alkalis, alkaline

earths, acids, salts and coloring matters, until by the absorbed liquids they had been wetted to the height of about an inch, showed, on testing the moistened portion with suitable reagents, that the upper part of the paper moistened by capillarity contained only water, while the dissolved substance was present only in the lower part of the paper, rising to different heights on using solutions of different substances; or that, in general, the water preceeds, more or less rapidly, by capillarity, the substances dissolved therein."

From a more extended abstract of Schoenbein's paper, published in "Journal de Pharmacie et de Chimie," 1862 [3], xlii, pp. 28-30, we condense the following particulars: The experiments were made with strips of unsized paper tinged with turmeric or litmus, or impregnated with solution of iron or other salt, or the experiment was performed in an atmosphere of sulphuretted hydrogen or ozone. The paper was suspended at a right angle above the liquid, in such a manner that the lower end dipped two or three millimeters into the solution, and was retained in this position until by capillary attraction the liquid had risen to the height of 3 centimeters. The figures given below indicate the height to which the substances dissolved rose in the paper, the remaining space up to 3 Cm. containing *pure* water.

Potassa, 1 per cent., 2 Cm.	Phosphoric acid, 1 per cent., 3 Cm.
Soda, } nearly as above.	(no separation of water).
Lithia, }	Gallie acid, 1 per cent., } 9 Mm.
Baryta, saturated, 1 Cm.	Pyrogallie acid, }
Strontia, " }	Ferric salts, 1 per cent., 15 Mm.
Lime, " }	Lead nitrate, 1 per cent., 18 Mm.
Sulphuric acid, 1 per cent., 18 Mm.	Silver salts, }
Nitric acid, }	Copper salts, } Similar to lead.
Hydrochloric acid, }	Cadmium salts, }
Oxalic acid, }	Potassium iodide, alkaline, 15 Mm.
Tartaric acid, }	(colored by ozone).

Solution of indigo; 12 Mm. contain the coloring matter; the remaining 18 Mm. contain liquid which is not of uniform composition.

Buliginsky's experiments ("Jahresb. d. Chem.," 1868, pp. 22-26) were made with capillary tubes, and showed that the height to which liquids are drawn is influenced by the temperature and by the strength of the solution. Solutions of ammonium chloride were the only ones of those examined which rose to a greater height than water, while the rise was less for solutions of sugar, potassium nitrate, sodium chlo-



ride, ammonium iodide, potassium chloride, magnesium chloride and ammonia.

Musculus recommended "capillarimetry" more particularly for the detection of alcohol, acetic acid, etc., in aqueous liquids ("Jahresb. d. Chem.," 1864, p. 5), and similar recommendations were previously made by Valson ("Jahresb. Physik," 1857, p. 2).

Experiments on the coefficients of capillarity of numerous substances were made by Wilhelmy ("Pogg. Ann.," cxix, p. 177; "Jahresb. d. Chem.," 1864, p. 6). Chevreul ("Comp. rend.," lxiii, p. 399; "Jahresb. d. Chem.," 1866, p. 8) called "capillary elective affinity" the property of linseed oil of displacing water from white lead, and of water displacing oil from a mixture with kaolin or with gray clay.

## BERBERINE AND DERIVATIVES.

The formula of this body, according to Fleitmann, is  $C_{42}H_{36}N_2O_9$ , according to Kemp,  $C_{42}H_{34}N_2O_7$ , according to Stas,  $C_{44}H_{33}N_2O_{10}$ , according to Henry,  $C_{42}H_{33}N_2O_{10}$ , and according to Serrius and Hlasiwetz,  $C_{20}H_{17}NO_4 \cdot 4\frac{1}{2}H_2O$ . From numerous analyses of the free base, the hydrochloride, nitrate, and sulphate, E. Schmidt (*Berichte* 16, 2589), assigns to it the formula  $C_{20}H_{17}NO_4 \cdot 4H_2O$ . Analyses of Hlasiwetz and Gilm's hydroberberine (*Annalen*, Suppl., 2, 191), its hydrochloride and nitrate confirm their formula,  $C_{20}H_{21}NO_4$ . From its behavior with ethyl iodide, hydroberberine must be a tertiary base. Berberine is converted into berberine hydriodide by treatment with ethyl iodide. The hydroxide obtained from hydroberberine ethiodide forms colorless needles melting at  $165^\circ$ ; it yields crystalline salts with hydrochloric, nitric, and sulphuric acids, and with platonic chloride. On oxidizing berberine with alkaline permanganate, a bibasic acid,  $C_{10}H_{10}O_6 + 2H_2O$ , melting at  $165^\circ$ , is obtained apparently identical with hemipinic acid.

*Derivatives.*—When berberine is heated in a retort with five times its weight of potassium hydroxide, it blackens, intumescs, and gives off ammonia, together with a small quantity of an oily liquid which, on examination, was found to be quinoline. From the residue in the retort, two acids were isolated, which were found to have all the properties ascribed to them by Hlasiwetz and Gilm; O. Bernheimer

(*Gazzetta*, 13, 342-347), is at present engaged in studying their constitution.

When hydroberberine is heated with methyl iodide at  $100^{\circ}$  in a closed tube, a yellow crystalline mass is obtained, which may be purified by repeating crystallization from boiling methyl alcohol. It crystallizes in the trimetric system:  $a:b:c = 1.10332:1:1.78880$ . Observed forms, 001, 111, 113; combinations, 001, 111, 113; cleavage perfect, 001. The *hydroberberine methiodide*,  $C_{20}H_{21}NO_4MeI$ , is sparingly soluble in water or alcohol in the cold, but readily when heated. When the iodide suspended in water is treated with silver oxide, it yields the corresponding hydroxide, which may be obtained in crystalline crusts,  $C_{20}H_{21}NO_4MeHO + H_2O$ , on evaporating the solution. It is strongly basic, and liberates ammonia from ammonium chloride. It dissolves in cold alcohol, but is insoluble in ether. On adding hydrochloric acid to its aqueous solution, the chloride is precipitated as a crystalline powder. The platinochloride crystallizes in beautiful lustrous plates, soluble in boiling alcohol. When heated in a sealed tube at  $150^{\circ}$ , the hydroxide is decomposed, with elimination of methyl alcohol. From these results, the author infers that hydroberberine, like berberine itself, is a tertiary base.

When berberine is heated with methyl iodide and methyl alcohol, it yields a methiodide,  $C_{20}H_{17}NO_4MeI$ , in stellate groups of slender needles. On treating this with silver oxide, the corresponding hydroxide is obtained, very similar in its properties to the hydroberberine compound. The platinochloride is a yellow powder.

Fleitmann (*Annalen*, 59, 176) in his paper on berberine mentions the formation of the hydrochloride of a base containing sulphur. The author, following Fleitmann's directions, added yellow ammonium sulphide to a solution of berberine hydrochloride, collected the red precipitate, dissolved it in warm water, and added hydrochloric acid; hydrogen sulphide was evolved, and on examining the solution it was found to contain berberine hydrochloride, but no trace of sulphuretted base. The red precipitate mentioned above is probably a persulphide of berberine.

On treating hydroberberine with iodine, both in chloroform solution, a brownish precipitate is obtained consisting of berberine hydriodide,  $C_{20}H_{17}NO_4HI$ . It is easily purified by crystallization from dilute alcohol.—*Jour. Chem. Soc.*, March 1884, p. 339, 340.

## NOTE ON THE MELTING POINTS, AND THEIR RELATION TO THE SOLUBILITY OF HYDRATED SALTS.

BY WILLIAM A. TILDEN, D.Sc., F.R.S.

In a paper read before the Royal Society last June, and since printed in the *Philosophical Transactions*, Mr. Shenstone and I drew attention to the relation observable in the solubility of salts in water at temperatures above  $100^{\circ}$ , and the melting points of the same salts in the anhydrous state. This relation may be exhibited by representing the solubilities graphically in the usual manner, when it is noticed that the curves of solubility of the most fusible turn up most rapidly, whilst the solubility of those less fusible increases nearly in proportion to the temperature, and the curves therefore approach a straight line. This is well seen in the case of two such salts as potassium chloride and potassium chlorate, or sodium chloride and potassium nitrate.

Feeling satisfied that the connection between fusibility and solubility observed in the salts referred to would be found to exist in other cases, I have lately been inquiring into the points of fusion of hydrated salts and their solubility below these temperatures. Very few of the melting points of salts containing water of crystallization could be found recorded, and I have therefore had to make a number of experiments. For assistance in this, and in the determination of solubility in a few cases, I am indebted to Mr. George Lloyd, lately a student in the Mason College Laboratory.

The melting points were ascertained in the following manner: Near to one end of a piece of tubing, drawn out very thin, and about a millimeter in diameter, a narrow strip of moist filter-paper was introduced, and the end then sealed. The tube was then bent twice at right angles, and into the upright open end was dropped a small clear crystal or fragment of the crystal of the salt, and the tube was then attached to a thermometer. Some preliminary trials having indicated the melting point of the salt within a few degrees, the thermometer and tube were stirred round in water or sulphuric acid a little below that temperature, and contained in a beaker placed over a lamp. The object of the damp paper at the bottom of the tube is to supply water-vapor, and so diminish the tendency of the salt to effloresce.

In many cases the melting point can be thus determined within half a degree, but though several experiments were made in each case,

the observations make no pretence to great accuracy. This is due chiefly to the fact that many salts are resolved into a mixture of liquid and solid, and the temperature at which this occurs is sometimes difficult to observe. The fact is these salts seem to be incapable of entering into true fusion, the partial liquefaction being the result of the formation of a crystalline hydrate containing a smaller proportion of water. This happens notably with the sulphate of zinc, cobalt, nickel and iron. On the other hand, there is often no sign of dissociation, as in the alums and many other salts, if the experiment is carefully performed. Of the following salts, the melting points have been given in two or three cases by other observers, but, except where an authority is mentioned, I have verified them all.

<i>Simple Sulphates.</i>	m. p.
MgSO <sub>4</sub> , 7H <sub>2</sub> O.....	70°
ZnSO <sub>4</sub> , 7H <sub>2</sub> O.....	50°
CoSO <sub>4</sub> , 7H <sub>2</sub> O.....	96—98°
NiSO <sub>4</sub> , 7H <sub>2</sub> O.....	98—100°
FeSO <sub>4</sub> , 7H <sub>2</sub> O.....	64°
MnSO <sub>4</sub> , 5H <sub>2</sub> O.....	54°
CdSO <sub>4</sub> , $\frac{8}{3}$ H <sub>2</sub> O.....	D <sup>1</sup>
CuSO <sub>4</sub> , 5H <sub>2</sub> O.....	D
Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> , 18H <sub>2</sub> O.....	D
Na <sub>2</sub> SO <sub>4</sub> , 10H <sub>2</sub> O.....	34°

<i>Double Sulphates.</i>	
KAl(SO <sub>4</sub> ) <sub>2</sub> , 12H <sub>2</sub> O.....	84·5°
NH <sub>4</sub> Al(SO <sub>4</sub> ) <sub>2</sub> , 12H <sub>2</sub> O..	92°
NaAl(SO <sub>4</sub> ) <sub>2</sub> , 12H <sub>2</sub> O....	61°
RbAl(SO <sub>4</sub> ) <sub>2</sub> , 12H <sub>2</sub> O....	99°
CsAl(SO <sub>4</sub> ) <sub>2</sub> , 12H <sub>2</sub> O....	105—106°
KCr(SO <sub>4</sub> ) <sub>2</sub> , 12H <sub>2</sub> O.....	89° <sup>2</sup>
Co(NH <sub>4</sub> ) <sub>2</sub> (SO <sub>4</sub> ) <sub>2</sub> , 6H <sub>2</sub> O	D
Ni(NH <sub>4</sub> ) <sub>2</sub> (SO <sub>4</sub> ) <sub>2</sub> , 6H <sub>2</sub> O	D
NiK <sub>2</sub> (SO <sub>4</sub> ) <sub>2</sub> , 6H <sub>2</sub> O.....	D
MgK <sub>2</sub> (SO <sub>4</sub> ) <sub>2</sub> , 6H <sub>2</sub> O.....	D
Mg(NH <sub>4</sub> ) <sub>2</sub> (SO <sub>4</sub> ) <sub>2</sub> , 6H <sub>2</sub> O	D

<i>Chromate.</i>	
Na <sub>2</sub> CrO <sub>4</sub> , 10H <sub>2</sub> O.....	23° (Berthelot)

<i>Arsenate.</i>	
Na <sub>2</sub> HAsO <sub>4</sub> , 12H <sub>2</sub> O.....	28°

<i>Phosphate.</i>	
Na <sub>2</sub> HPO <sub>4</sub> , 12H <sub>2</sub> O.....	35°

<i>Phosphate.</i>	m. p.
KH <sub>2</sub> PO <sub>4</sub> (anhydrous)	96°

<i>Chlorides.</i>	
BaCl <sub>2</sub> , 2H <sub>2</sub> O.....	D
SrCl <sub>2</sub> , 6H <sub>2</sub> O.....	112°
CaCl <sub>2</sub> , 6H <sub>2</sub> O.....	28°

<i>Carbonate.</i>	
Na <sub>2</sub> CO <sub>3</sub> , 10H <sub>2</sub> O.....	34°

<i>Oxalates.</i>	
H <sub>2</sub> C <sub>2</sub> O <sub>4</sub> , 2H <sub>2</sub> O.....	98·5°
(NH <sub>4</sub> ) <sub>2</sub> C <sub>2</sub> O <sub>4</sub> , H <sub>2</sub> O.....	D

<i>Acetates.</i>	
NaC <sub>2</sub> H <sub>3</sub> O <sub>2</sub> , H <sub>2</sub> O.....	58·5°
Cu(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> , H <sub>2</sub> O.....	D

<i>Borate.</i>	
Na <sub>2</sub> H <sub>2</sub> B <sub>4</sub> O <sub>8</sub> , 9H <sub>2</sub> O.....	75·5

<i>Theiosulphate.</i>	
Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , 5H <sub>2</sub> O.....	48·5

<i>Nitrates.</i>	
Ca(NO <sub>3</sub> ) <sub>2</sub> , 4H <sub>2</sub> O.....	44° (Ordway)
Mg(NO <sub>3</sub> ) <sub>2</sub> , 6H <sub>2</sub> O.....	90° "
Ni(NO <sub>3</sub> ) <sub>2</sub> , 6H <sub>2</sub> O.....	56·7° "
Cd(NO <sub>3</sub> ) <sub>2</sub> , 4H <sub>2</sub> O.....	59·5° "
Zn(NO <sub>3</sub> ) <sub>2</sub> , 6H <sub>2</sub> O.....	36·4° "
Mn(NO <sub>3</sub> ) <sub>2</sub> , 6H <sub>2</sub> O.....	25·8° "
Ca(NO <sub>3</sub> ) <sub>2</sub> , 6H <sub>2</sub> O.....	26·4° "
Cu(NO <sub>3</sub> ) <sub>2</sub> , 3H <sub>2</sub> O.....	114·5° "

<sup>1</sup> D = gives off its water without melting.

<sup>2</sup> Converted into green salt.



The temperatures given above, at which incipient fusion occurs, are in many cases the temperatures at which the turning point in the curve of solubility occurs. It appears therefore probable that the crystallized hydrates, even when in solution, are completely dissociated within comparatively narrow limits of temperature. One of the most striking examples is of course sodium sulphate, but similar phenomena are exhibited by sodium carbonate and chromate, and by manganous, ferrous and other sulphates. This dissociation must also be the cause of the fact that the solubility at or about the melting point of so many salts is less than would be otherwise expected. It must, however, be pointed out that salts like sodium sulphate and phosphate, which may be melted in their water of crystallization, are miscible with water at the same temperature in all proportions, in other words the solubility of the crystallized salt is infinite. Hence there must be something wrong in some of the recorded solubilities of such salts at these temperatures.

If we take from the list salts which are isomorphous with one another and contain the same amount of water of crystallization, and which alone are comparable among themselves, we find that the solubility and fusibility stand in the same order at all temperatures below the point of fusion or dissociation of the hydrate.

The following are examples :

The solubility is taken to be the weight of crystallized salt dissolved in 100 parts of water :

*Zinc and Magnesium Sulphates.*

	m. p.	Solubility at 0°.	40°.	50°.
Zinc.....	50°	115.2	224	263.8
Magnesium.....	70°	72.4	178	212.6 (at 49°)

*Alums.*

	m. p.	Solubility at 0°.	17°.	20°.	50°.
Sodium.....	61°	110	.....	.....	.....
Potassium.....	84.5°	3.9	.....	15.13	44.11
Rubidium.....	89°	.....	2.27	(Redtenbacher, <i>Watts's</i>	
Cesium.....	105—106°	.....	0.619	<i>Diet.</i> [5], 580—583.)	

*Sodium Arsenate and Phosphate.*

	m. p.	Solubility at 0°.	20°.
Arsenate.....	28°	17.2	140.7 (at 21°)
Phosphate.....	35°	6.5	27.2

*Calcium and Strontium Chlorides.*

	m. p.	Solubility at 0°.	40°.
Calcium.....	28°	165.7	7,141.0
Strontium.....	112°	106.2	205.8

Information is yet wanting as to the solubility of many of the salts in the list.

It is of course not maintained that fusibility is the sole cause of solubility, for amongst the commonest phenomena of solution are very many difficulties which cannot be explained away. But there can be no doubt that fusibility and solubility are closely connected together, and I have ventured to bring the subject under the notice of the Society because it can scarcely be advanced any further till a much greater store of experimental data has been accumulated.—*Jour. Chem. Soc.*, July, 1884, p. 266.

## QUININE AND HOMOQUININE.<sup>1</sup>

BY O. HESSE.

### I. QUININE.

The question, formerly raised repeatedly, whether quinine occurs in other barks than those of the genus *Cinchona*, I was able to answer in the affirmative in 1871, when I showed that a bark at that time coming into commerce and erroneously sent out as a cinchona bark,—the china cuprea, which we now know to be derived from *Remijia pedunculata*,—actually contained this alkaloid.<sup>2</sup> My priority in this discovery has indeed been contested, in that J. E. Howard has stated<sup>3</sup> that already in 1857 he had observed this bark in the London market and found it to contain quinine, although he had published nothing respecting it. But since Howard only a short time previously (November, 1869,) had afresh affirmed to the quinologist Weddell<sup>4</sup> the experimental law at that time generally held to be correct, that the cinchona alkaloids were peculiar to the cinchonas only, it may be as-

<sup>1</sup> From the *Annalen der Chemie*, cxxv., 95.

<sup>2</sup> *Berichte*, iv., 818; *Am. Jour. Phar.*, 1872, 213.

<sup>3</sup> *Neues Jahrbuch f. Pharm.*, xxxvi., 296; Flückiger, "Die Chinارينden," 1883, 43.

<sup>4</sup> *Uebersicht d. Cinchonon*, Weddell, 7.

sumed that Howard first had his attention drawn to the presence of quinine in the bark in question by my discovery, which Flückiger had communicated to him privately.

Far more important than this point is the question whether the alkaloid of cuprea bark then spoken of as quinine was quinine, or only an alkaloid similar to it, homoquinine. Notwithstanding that at the time I found the alkaloid in question to correspond in every respect with quinine obtained from true cinchona bark, I have once more examined the original cuprea bark in connection with my experiments upon homoquinine, the former results being confirmed most completely. Subsequently, also, it was pointed out by me that in cuprea bark quinine is not accompanied by cinchonidine, which has equally been since confirmed by D. Howard and others. On the other hand, according to my observation, quinine is always present in cuprea bark, although the quantity is sometimes relatively very small.

The constant occurrence of quinine in cuprea bark and the persistent absence from it of cinchonidine is so far of special interest that it has been assumed in several quarters, especially by J. E. Howard,<sup>1</sup> that the plants in their development and growth are capable of converting quinine and cinchonidine into one another. Of course in order to make this conversion perceptible certain influences on the development of the plants or their cultivation at different altitudes are required. Nevertheless, the assumption of such a change as this during the development and growth of the plant proves faulty, since if such a conversion actually took place under the conditions named, it would certainly be possible to discover a sample of cuprea bark in which at least traces of cinchonidine would be present.

Although I am in the position to detect the smallest traces of cinchonidine with quinine, all the experiments made in this direction with cuprea bark, as well as with quinine obtained from that bark, have remained without success, a result that justifies me in saying that the formation of the quinine within the plant takes place quite independently of the cinchonidine.

On account of the absence of cinchonidine it is very easy to prepare pure quinine sulphate from cuprea bark. This has normally, whilst yet uneffloresced, the composition represented by the formula  $(C_{20}H_{21}N_2O_2)_2, SO_4H_2 + 8H_2O$ , like the similarly pure salt obtainable from

<sup>1</sup> *Pharm. Journal*, [3], xiii, 1013; *Am. Jour. Pharm.*, 1883, 520.

cinchona barks.<sup>1</sup> The possibility is not, however, excluded that the commercial sulphate obtained from cuprea bark may contain somewhat less than eight molecules of water of crystallization, not only because it has effloresced more or less, but also because it contains an admixture of homoquinine.

## II. HOMOQUININE.

The occurrence in cuprea bark of a special alkaloid, similar in many respects to quinine, was announced simultaneously, in December, 1881, by D. Howard and Hodgkin, Paul and Cowley, and G. Whiffen,<sup>2</sup> the alkaloid being named by the first two chemists "homoquinine," and by Whiffen "ultraquinine." The name "cupreine" has also been suggested for it. This same alkaloid was also observed by one of my colleagues a year earlier; but he considered it to be cinchonidine until June, 1881, when he became aware of the error.

According to Tod the alkaloid in question first appeared in cuprea bark in September, 1880, but only in a few specimens of bark; its occurrence first became almost general in May, 1881. The amount of homoquinine in the bark in many cases reached 0.3 per cent., in some

<sup>1</sup> With respect to the remark of Flückiger upon this salt ("Die Chinarrinden," 1883, p. 55), that "it is not established whether this salt contains seven or eight molecules of water of crystallization, or possibly a quantity lying between the two," I may say that more than twenty years since (*Annalen*, cxix, 361) it was shown by Jobst and myself that the formula  $(C_{20}H_{24}N_2O_2)_2 \cdot SO_4H_2 + 7H_2O$ , for quinine sulphate, is incorrect. On the other hand, it is not so easy to say whether the sulphate in question contains seven and a half or eight molecules of  $H_2O$ . A series of experiments, however, carried out by me with every precaution, showed that pure un-effloresced sulphate may actually contain eight molecules of water of crystallization. In that case the formula attributed to quinine sulphate by Robiquet about fifty years ago would be correct.

Undoubtedly the commercial sulphate may contain generally less water than is required by the formula  $(C_{20}H_{24}N_2O_2)_2 \cdot SO_4H_2 + 8H_2O$ , and for this reason, that in manufacturing operations it is almost impossible to prepare it dry and avoid at the same time the occurrence of a partial efflorescence of the salt. Quite apart from the fact that in certain quarters a smaller amount of water (for instance, 14.4 per cent.) in quinine sulphate is required, it should not be overlooked that a commercial sulphate corresponding to the legally prescribed tests of the German Pharmacopœia may sometimes contain quite a considerable quantity of cinchonidine sulphate (*Annalen*, ccv, 222), upon which a deficiency in water of crystallization may equally depend.

<sup>2</sup> *Pharm. Journ.*, [3], xii, 497, 528, 565; *Am. Jour. Phar.*, 1882, 75.



0.5 to 0.6 per cent. According to Whiffen the cuprea bark examined shortly before the publication referred to contained 0.1 to 0.8 per cent. of the alkaloid, and he believed that in greater or less quantity it was to be met with in every cuprea bark. Paul and Cownley first observed it very frequently four months before their communication (consequently first in August, 1881). D. Howard, who appears not to have observed it so frequently as Paul and Cownley, states that the quantity of homoquinine in the barks in question amounted to about 10 per cent. of their quinine contents, consequently to about 0.2 per cent. Finally to complete the history of our alkaloid it may be mentioned that Wood and Barret<sup>1</sup> were unable to observe this alkaloid in several hundred specimens of cuprea bark which they examined specially for the purpose, and they believed that it might be a compound of quinine with conchicine.

With respect to this latter point, my examination of the alkaloid prepared by Tod, as well as of some kindly supplied to me by Paul and Cownley, has shown that this material is free from conchicine. Moreover the statement made by Whiffen, as well as those of Howard and Hodgkin, point to the same conclusion, so that the opinion of Wood and Barret referred to would appear to be without support, quite apart from the fact that I have been unable to obtain any such compound of quinine and conchicine in working according to the directions originally given by those chemists.

All the above-named chemists who have indicated the existence of homoquinine in one way or another are unanimous that the alkaloid in question forms with sulphuric acid a neutral salt rather difficultly soluble in cold water; it is presumed consequently that it would be necessarily mixed with quinine sulphate prepared from the particular bark, since it would not be separated or altered in any way during the manufacture of quinine.

According to my experience the best method of separating homoquinine from such a mixture is by dissolving it in dilute sulphuric acid, precipitating the alkaloids with ammonia and at once shaking them out with ether, from which after a short time the homoquinine separates out in crystals. The crystallized homoquinine, after being separated as completely as possible from the mother-liquor, is redissolved in dilute sulphuric acid, and again precipitated with ammonia

<sup>1</sup> *Chemical News*, xlv, 6; *Am. Jour. Phar.*, 1882, 75.

and taken up with ether, which quickly deposits the alkaloid in crystals. This operation is repeated as often as may be necessary, but generally a second recrystallization of the base in this way suffices to separate any admixture of quinine.

On a previous occasion,<sup>1</sup> I had, upon the basis of the results of analyses I and II, which were before me at the time, represented homoquinine by the formula  $C_{19}H_{22}N_2O_2$ . But in the course of this investigation it has given weighty evidence in favor of the formula  $C_{20}H_{24}N_2O_2$ , with which, moreover, analysis IV, made by me only recently with well crystallized material, corresponds very well. Before analysis the substance was dried at  $120^\circ$  to  $125^\circ$  C.; it then gave:

- I. 0.2154 gram  $0.5820$   $CO_2$  and  $0.1420$   $H_2O$   
 II. 0.2486 gram  $0.6535$   $CO_2$  and  $0.1555$   $H_2O$   
 III. 0.2453 gram  $0.6660$   $CO_2$  and  $0.1585$   $H_2O$   
 IV. 0.2613 gram  $0.7095$   $CO_2$  and  $0.1765$   $H_2O$

		Calculated for		Found.			
		$C_{19}H_{22}N_2O_2$	$C_{20}H_{24}N_2O_2$	I.	II.	III.	IV.
C.	73.54	. . .	74.07	73.73	73.16	74.04	74.05
H.	7.09	. . .	7.41	7.35	7.09	7.17	7.50

From ether containing water homoquinine separates, if undisturbed, partly in concentrically grouped needles, partly in stout decided prisms, derived from the rhombic system, terminating at the ends in a dome, the crystals being sometimes isolated and sometimes a few concentrically aggregated together. In a disturbed crystallization, on the other hand, according to the degree of concentration of the solution, either a sandy powder or a crystallization consisting of delicate lamellæ is obtained. In all cases it contains water of crystallization, the quantity varying between 2 and  $2\frac{1}{2}$  molecules, a part of which is readily given off at  $80^\circ$  to  $100^\circ$  C., and the remainder first at  $120^\circ$  to  $125^\circ$  C.

- I. 0.2438 gram gave at  $120^\circ$  to  $125^\circ$  C.  $0.0284$   $H_2O$   
 II. 0.2784 gram gave at  $120^\circ$  to  $125^\circ$  C.  $0.0303$   $H_2O$   
 III. 0.2500 gram gave at  $120^\circ$  to  $125^\circ$  C.  $0.0260$   $H_2O$   
 IV. 0.2733 gram gave at  $120^\circ$  to  $125^\circ$  C.  $0.0273$   $H_2O$   
 V. 0.2935 gram gave at  $120^\circ$  to  $125^\circ$  C.  $0.0322$   $H_2O$   
 VI. 0.6085 gram gave at  $120^\circ$  to  $125^\circ$  C.  $0.0710$   $H_2O$

		Calculated for							
		$C_{20}H_{24}N_2O_2 + 2H_2O$	$C_{20}H_{24}N_2O_2 + 2\frac{1}{2}H_2O$						
$H_2O$	. . .	10.0	12.19						
		Found							
I.	II.	III.	IV.	V.	VI.				
11.65	10.88	10.40	10.00	10.97	11.66				

<sup>1</sup> *Berichte*, xv, 857; *Am. Jour. Pharm.*, 1882, 364.

Crystals of homoquinine exposed to the air gradually become dull through efflorescence; in the more compact crystals, however, the amount of water never falls below 10 per cent.<sup>1</sup> They can be exposed directly to a temperature of 100° C. without any fear that they will fuse, like, for instance, crystallized quinine trihydrate. At that temperature the alkaloid loses only a portion of its water of crystallization; it first melts at 170° C., forming, upon cooling, a colorless amorphous mass.

Homoquinine dissolves in ether with somewhat more difficulty than quinine; its solution does not gelatinize upon evaporation of the ether, but crystallizes up to the last drops, if the ether be absolutely free from alcohol. In chloroform it dissolves readily, but with more difficulty in benzol and very slightly in light petroleum spirit. Alcohol dissolves it freely and leaves it upon evaporation in the amorphous form.

The alcoholic solution of homoquinine tastes intensely bitter and has a strongly basic reaction; it neutralizes hydrochloric and sulphuric acids perfectly. Its solution in an excess of dilute sulphuric acid shows a blue fluorescence, which is dispelled by sodium chloride and other haloid salts. Hydrochloric acid also removes this appearance, and a solution of the base in hydrochloric acid shows no fluorescence. These solutions rotate the plane of polarized light to the left; they give upon the addition of chlorine water or hypochlorite of lime and excess of ammonia a dark green color, like quinine.

With acids homoquinine forms neutral and acid salts, which, so far as they have up to the present been examined, correspond in their behavior towards precipitants, such as sodium hydrate and carbonate and ammonia, with the corresponding quinine salts; on the other hand, they differ from them in their form and partially in their greater solubility. On account of insufficiency of material I have only been able to deal at all exhaustively with the following salts:

*Neutral Hydrochlorate of Homoquinine* is obtained by neutralization of an alcoholic solution of the alkaloid with hydrochloric acid. Upon evaporation of this solution an amorphous residue is left that

<sup>1</sup> The substance obtained in delicate lamellæ effloresces very rapidly, and frequently after a few hours the quantity of water of crystallization amounts to only about 6 per cent. This phenomenon may probably be partially due to the larger surface which the lamellæ have as compared with the more compact crystals.

dissolves readily in water. The aqueous solution leaves again upon spontaneous evaporation an amorphous residue.

*Acid Hydrochlorate of Homoquinine* is obtained upon adding some hydrochloric acid to a concentrated aqueous solution of the neutral hydrochlorate; the acid hydrochlorate separates at once in stout colorless prisms, which dissolve pretty freely in water, but less readily in hydrochloric acid.

*Acid Chloroplatinate of Homoquinine*.—Upon mixing an aqueous solution of the previous salt with platinum solution a pale yellow flocculent precipitate results, which almost immediately is re-arranged in small orange-red prisms. The salt contains water of crystallization that is first given off at  $120^{\circ}$  C.

*Hydrosulphocyanide of Homoquinine* is obtained upon mixing a solution of the neutral hydrochlorate with potassium sulpho-cyanide. It is amorphous, dissolves slightly in cold water, but more freely in hot water and in alcohol.

*Neutral Sulphate of Homoquinine* is obtained upon saturation of hot dilute sulphuric acid with the base. Upon cooling of the solution the sulphate crystallizes in short six-sided colorless prisms, which being very brittle are broken more or less in collection. The salt dissolves in about thirty parts of boiling water, very slightly in cold water, freely in boiling alcohol, and is nearly insoluble in chloroform and ether.

Samples prepared on different occasions gave upon analysis the following results:

I. 0.2490 gram gave at $120^{\circ}$ C. 0.0333 $\text{H}_2\text{O}$ .				
II. 0.4848 gram gave at $120^{\circ}$ C. 0.0608 $\text{H}_2\text{O}$ .				
III. 0.3300 gram gave at $120^{\circ}$ C. 0.0420 $\text{H}_2\text{O}$ and 0.0925 $\text{SO}_4$ Ba.				
IV. 0.2243 gram gave at $120^{\circ}$ C. 0.0293 $\text{H}_2\text{O}$ .				
Calculated for		Found.		
$(\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2)_2 \cdot \text{SO}_4 \cdot 11\text{H}_2\text{O}$ .		I.	II.	III.
$\text{H}_2\text{O}$	12.64	13.37	12.50	12.85
$\text{SO}_3$	9.37	...	...	9.62

The crystals of this salt effloresce superficially in air, and become consequently dull; the loss of water is, however, not worth notice. Even after a considerable time the water of crystallization amounts still to 12.50 per cent. On the other hand, quinine sulphate exposed to exactly the same conditions would at the end of a couple of hours have fallen to a powder, and would then contain only 4.2 to 4.6 per cent. of water. If the two sulphates, dehydrated at  $120^{\circ}$  C., be exposed

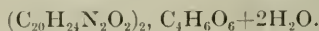


to moist air, the quinine sulphate rapidly takes up 4 per cent. of water, but the homoquinine almost three times as much, namely, 11 to 12 per cent.

It was of especial interest to ascertain the behavior of homoquinine to polarized light, since the alkaloid on account of this behavior received from Whiffen the name "ultraquinine." According to Whiffen this sulphate in acid solution showed  $(a)_D = -221^\circ$ , whilst quinine sulphate only showed  $(a)_D = -196^\circ$ . Of the water of crystallization of the two sulphates, in which they certainly differ from each other, Whiffen makes no mention, so that it is quite possible that the difference in question was purely dependent upon the different quantities of water of crystallization which they contain.

In my experiments the amount of water of crystallization was first exactly estimated, and then a quantity of each of the hydrated sulphates corresponding to 1.25 gram of anhydrous salt was dissolved in 10 cc. of normal hydrochloric acid. These solutions were then each diluted with water up to 25 cc., and finally examined at  $t=50^\circ$  and  $l=220$ , the deviation being sometimes determined first by means of the quinine solution, and then this solution changed for the homoquinine solution, and sometimes the order being reversed. In this way it was ascertained that *the two solutions did not differ from one another in respect to their optical behavior*. In an average of thirty determinations  $a = 25.92^\circ$ , which gives for the anhydrous sulphate  $(a)_D = -235.6^\circ$ .

*Neutral Tartrate of Homoquinine* is obtained by mixing a hot aqueous solution of the sulphate with solution of Rochelle salt. It forms delicate white concentrically grouped needles, which dissolve with some difficulty in hot water and are very slightly soluble in cold. The composition of the salt is represented by the formula—



0.3305 gram of air-dried substance gave at  $120^\circ C.$  0.014  $H_2O$ .

	Calculated for	Found.
$H_2O$ . . . . .	4.31 . . . . .	4.23

The tartrate dried at  $120^\circ C.$ , takes up from moist air only 1 molecule of  $H_2O$ ; it has then the same percentage composition as neutral tartrate of quinine.

The dissimilar composition of the two tartrates must not be overlooked in the estimation of quinine optically by the method of Oude-

mans, jun.,<sup>1</sup> otherwise, up to about 4 per cent. of cinchonidine sulphate might be "found" in a quinine sulphate, obtained from cuprea bark in which not a trace was present. This mistake may, however, be easily avoided, by previously determining the amount of water in the tartrate, and as I have done in my optical quinine test,<sup>2</sup> starting from the anhydrous salt.

### III. CONVERSION OF HOMOQUININE INTO QUININE.

Some observations which I made during the investigation of cuprea bark agreed pretty well with the presumption that under certain conditions homoquinine might change into quinine. To ascertain these conditions I first heated the alkaloid to 100° C. with dilute hydrochloric or sulphuric acid, sometimes in open vessels and sometimes in closed tubes, but without result. Hydrochloric acid of specific gravity 1.125 acted no better; but upon heating the latter solution some hours to 140°C., methyl chloride and apoquinine were formed, as with quinine. Nevertheless, I was unable to separate quinine from this solution by means of ammonia before this formation took place. If, however, soda lye were used for the precipitation of the alkaloid, a certain quantity of quinine now resulted. In consequence of this observation I was now able, by repeated precipitations with soda lye, shaking the precipitates with ether, and this solution with very dilute sulphuric acid, to convert homoquinine completely into quinine. The conversion is essentially accelerated by heating the base with soda lye, a previous heating of the acid solution being thereby made unnecessary.

From the quinine obtained through conversion of homoquinine the neutral sulphate was prepared, which gave

- I. 0.5425 gram at 120° 0.0893 H<sub>2</sub>O.
- II. 0.7320 gram at 103° 0.1170 H<sub>2</sub>O.
- III. 0.4625 gram at 120° 0.0720 H<sub>2</sub>O.

Calculated for	Found		
	I.	II.	III.
(C <sub>20</sub> H <sub>24</sub> N <sub>2</sub> O <sub>2</sub> ) <sub>2</sub> .SO <sub>4</sub> H <sub>2</sub> +8 H <sub>2</sub> O			
H <sub>2</sub> O . . . 16.17	16.46	15.97	15.54

This salt effervesced rapidly in dry air and then contained still 2 molecules of H<sub>2</sub>O. On the other hand, the dried sulphate quickly took up 4 to 4.6 per cent. of water.

<sup>1</sup> *Annalen*, clxxxii, 65.

<sup>2</sup> *Annalen*, ccv, 217.

In other respects also no difference could be recognized from the known pure sulphate.

#### IV. CONCLUDING REMARKS.

The foregoing results justify the conclusion that Barret and Wood in their investigation converted the homoquinine into quinine and that it thus escaped observation by them. I myself also had previously fruitlessly endeavored to prepare the alkaloid in question from cuprea bark. It was only after a series of English chemists had simultaneously affirmed the existence of homoquinine that I felt I ought to drop my doubts as to the peculiarity of the alkaloid, which was at any rate first prepared by Tod; but up to that time I had considered the substance in question to be none other than *crystallized quinine*.

Upon the grounds stated my original opinion as to the nature of this substance might still be correct. It is true that at present I have not yet succeeded in preparing homoquinine from cinchona bark, and it may be there is no present prospect that it is obtainable from that bark, so that this substance may still pass as characteristic of the *Remijia pedunculata*, which yields the cuprea bark. But I might maintain to the contrary that I formerly had the opportunity of being able to point out that quinine under certain conditions would become modified, in that it passed into the anhydride, and that this substance also *behaved as a special alkaloid*. At that time also I succeeded in reconverting this substance into ordinary quinine through prolonged treatment with dilute sulphuric acid, though not through precipitation with soda lye.<sup>1</sup>

Besides this modification of quinine there exists at least one more, which forms with sulphuric acid a neutral sulphate that separates from a hot aqueous solution as a jelly, only subsequently assuming a crystalline form.<sup>2</sup> I was formerly inclined to place this peculiarity of the sulphate in question to the account of a coloring substance, concerning which not much was known. Nevertheless, exactly those solutions from which quinine sulphate separates at first in a gelatinous form are so very little colored that the cause of the gelatinization might far rather be sought in the absence of coloring matter. I may also add that in the cases mentioned, if the alkaloid be taken up in ether, the ethereal solution gelatinizes relatively easy. These peculiarities of the

<sup>1</sup> *Annalen*, clxxxvi, 207.

<sup>2</sup> *Annalen*, clxvi, 262.

alkaloid disappear, however, most surely if the sulphuric acid solution be subjected to a prolonged boiling.

The most important results of the foregoing investigations may be brought together in the following propositions:

- (1.) Homoquinine is a modification of quinine.
- (2.) Cuprea bark in many cases contains this modification together with quinine.
- (3.) Several modifications of quinine exist, which by suitable treatment pass into ordinary quinine.

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## LUKRABO OR TA-FUNG-TSZE.

BY E. M. HOLMES, F.L.S.,

*Curator of the Museum of the Pharmaceutical Society.*

In the interesting papers on "Chinese Materia Medica," by the late Daniel Hanbury, published in the *Pharmaceutical Journal* ([2], vol. iii., 1862), a seed is described and illustrated under the name of *Ta-fung-tsze*, which he conjectured to be allied to *Chaulmugra*. This seed is largely used in China in skin diseases and leprosy, and appears to have been employed in that country for at least three hundred years, since the tree affording the seed is figured in the old Chinese herbal, "Puntsau," published A.D. 1596. The tree, however, has up to the present time been unknown to botanists.

The *Ta-fung-tsze* is still an article of considerable commerce, figuring in the Consular Blue Books under Chinese imports by the name of *Lukrabo*. As much as 48 piculs (6,400 lbs.) of the seed were exported from Bangkok to China in 1871. It is also exported thither from Saigon in Cochin China. The seed in question is about half the length of *Chaulmugra* seed, but of equal diameter. The shell is thicker and harder, and at one end is marked with a few radiating slightly raised ridges, whereas that of *Chaulmugra* is quite smooth.

Dr. Porter Smith, in his "Chinese Materia Medica." (1871), p. 140, describes these seeds under the name of *Luerubau*, and he also considers them as a variety of *Chaulmugra*. He states that they are described in Chinese books as being good for leprosy, lepra, itch, pityriasis, psoriasis, syphilis, lipoma, vermes, and chaps upon the back of the hands, and that calomel and the seeds of *Robinia amara* are used with the *Luerubau*, both externally and internally, in the treatment of



leprosy. In the northern province of Hupeh the seeds are in great repute as a remedy for parasitic pediculi and the itch insect. In Soubeiran's "Matière Médicale chez les Chinois" (p. 221), the seeds are erroneously referred to *Gynocardia odorata*.

In the Kew Report (1878, p. 33) the seeds, under the name of *Dai-phong-tu*, are said to be used in Saigon as a vermifuge after the extraction of the oil. It is added that M. Pierre has successfully raised some seeds of the plant, and refers it to the genus *Hydnocarpus*. The species, however, is not mentioned in the Kew Report and no further information has appeared in it upon this point in subsequent years. Having had a specimen of the *Lukrabo* seed in the museum of the Pharmaceutical Society for some years—without a specific name—I recently wrote to M. Pierre for information as to the species yielding the seed. In response he has kindly forwarded for the herbarium of this Society a specimen of the plant with flowers and seeds, and the following interesting statement: "It is a new species which I have named *Hydnocarpus anthelminthica*, Pierre. It is very nearly allied to *H. alpina*, Wight, p. 940, but its leaves are more linear-oblong. The scales opposite to the petals are less long and more ciliated, the stigma is furrowed in its whole extent, and is only toothed towards the extremity of its reflexed margin, while in *H. alpina* it is furnished with large lobes. The male flower contains a rudimentary ovary; in the female flower this is pyramidal. The seeds are used as a vermifuge by the Annamites. The names given in Annam to the plant are *Dai-phong-tu* and *Thaoc-phu-tu*. The specimen sent was gathered in the province of Bien Hoa in Southern Cochin China." A figure of the tree will, I presume, be given in the magnificent "Forest Flora of Cochin China," now being published by M. L. Pierre under the auspices of the French Government.

The botanical source of this important eastern drug is thus at last satisfactorily cleared up.—*Phar. Jour. and Trans.*, July 16, 1884, p. 41.

RESORCIN FOR THE RELIEF OF PAIN.—Andeer finds that although resorcin has no benumbing effect upon the normal human skin, yet it has very decided analgesic properties in painful affections of the skin or mucous membranes. He also gives it internally in colic, cardialgia, and painful affections of the larynx, in increasing doses of one to ten gm. and also in the form of clysters (thirty per cent. solution), with satisfactory result.—*Phila. Med. Times*, Aug. 9.

## RESEARCHES ON THE DISEASES OF ANIMALS.

BY PASTEUR AND OTHERS.

Pasteur's results may be summarized as follows: It is proved by inoculation experiments that both quiet and raving madness originate from the same poison. The symptoms of madness are extremely variable, and depend apparently on the part of the nervous system attacked by the poison. The infectious matter is in the form of microbes in the saliva of mad animals; inoculation with it causes death in three ways, either by microbating the saliva, or by the excessive production of pus, or by the development of madness. The marrow, brain, and spinal cord are always virulent in all animals dying of madness, the virulence increasing until putrefaction sets in. In one case a brain was sustained at a temperature of 12° for three weeks by this action. To produce madness quickly and surely, after trepanning, inoculate in the skin on the surface of the brain; the disease will make its appearance in 6, 8, or 10 days. The malady produced by injection into the blood system exhibits symptoms which differ greatly from those of raving madness caused by a bite or by inoculation after trepanning, and hence many cases of the quiet form may escape observation. In those which may be termed moderate, pronounced paralysis ensues, whilst raving and howling are not observed. When the poison is injected into the blood, the spinal cord seems to be the first point attacked. Injection of saliva or blood from a mad subject into the veins does not protect a dog from a subsequent outbreak of madness, or from death after a second inoculation of mad matter, either by trepanning or injection in a vein. \* Cases of spontaneous recovery have been observed when early symptoms only were developed, but never after the symptoms became violent. In some cases after they had disappeared they returned after two months, whereupon death followed.

As a great many sheep are lost after protective inoculation for sheep-poek, Peuch has investigated the subject, and from the results of his experiments draws the conclusion that this danger may be greatly reduced by using small quantities of lymph diluted 60 to 120 times.

Thiernesse and Degive have made experiments on protective inoculation for lung epidemics. Their results show that 2 grams of lung epidemic poison may be injected into the veins without danger, provided it does not touch the cell-tissue. Immunity to the same extent

results from this injection as from the tail inoculation recommended by Willems. Immunity in this case is sometimes perfect, and does not cause changes which occur when the disease is taken in the natural way. — *Bied. Centr.*, 1883, pp. 674-677; *Jour. Chem. Soc.*, May, 1884, p. 623.

## ACCELERATION OF THE OXIDATION OF DRYING OILS.

BY A. LIVACHE.

When a drying oil, previously treated with litharge or finely divided metallic lead is agitated with a solution of zinc sulphate, all the lead is precipitated from the oil, but the latter now holds zinc in solution. By using manganese sulphate, copper sulphate, etc., in this way, every trace of lead is removed from the oil, but the lead is replaced by manganese, copper, etc. If an oil charged with lead will dry in 24 hours when spread out in a thin layer on glass, it will dry completely in five or six hours if charged with manganese, in 30 to 36 hours with copper, zinc or cobalt, and in more than 48 hours with nickel, iron, chromium, etc.

It is more convenient to use the solid finely powdered salt in place of a solution, since the latter forms an emulsion with the oil. In fact, treatment with metallic lead and a solid sulphate may take place simultaneously, but in this case the oil will contain some lead in addition to the other metal.

Although solidification of a drying oil charged with manganese takes place in five or six hours when spread out in thin layers, the solidification of thick layers requires a long time, even though the protecting pellicle which forms on the surface is continually removed. Oxidation is more rapid at a higher temperature, but with thick layers a long time is required for complete solidification, even under these conditions.

A temperature of 50-60° accelerates the oxidation of drying oil, partly because the oil becomes more fluid, and partly because the oxygen is more active at a higher temperature.

When a manganiferous oil is dissolved in an equal volume of benzene, and agitated with air in a closed vessel, rapid absorption of oxygen takes place, especially at a temperature of 40-50°. If the air

is continually renewed, so as to furnish the oxygen required for the maximum oxidation of the oil, the liquid becomes thick, and on distilling and separating the solvent a liquid is obtained which solidifies on cooling to a very dry and perfectly elastic solid. It is evident that by limiting the oxidation a series of products of varying viscosity, can be obtained intermediate between the original oil and the solid formed by maximum oxidation. The last product is characterized by its remarkable elasticity, and its absolute insolubility in water, alcohol, and ether. It is almost instantly saponified by potash in the cold, and on subsequent separation of the fatty acids it is found that the solid fatty acids have undergone no alteration, whilst the liquid fatty acid has almost completely disappeared, and has been converted into viscous products, characterized by their solubility in water and by the various salts which they form.—*Comp. Rend.*, 97, 1311–1314; *Jour. Chem. Soc.*, April, 1884, p. 532.

## VEGETABLES USED AS FOOD IN JAPAN.

BY O. KELLNER.

Vegetables form a large part of the people's food in Japan; the varieties in use are many, and the methods of cooking numerous; some are preserved by simple air-drying; others are made into jams, pickled with sugar or acidified. The soja bean is the foundation of an almost universally used sauce, *Schoyu*; of a vegetable cheese, *Miso*; and of a highly albuminous jelly, *Tofu*; a large number of the plants are indigenous, other peculiar to warm climates, and few have hitherto been submitted to chemical examination. Rice is the largest article of consumption, and of it there are many varieties, all of which are grouped in two divisions: one, the mountain rice grown on dry ground; the other marsh rice, cultivated in irrigated fields, both being botanically the same. Of the marsh rice there are also two principal divisions—ordinary and glutinous rice; the following analyses of dry matter in the three kinds are given:—

	Ordinary.	Glutinous.	Mountain.
Protein matter.....	7.00	5.87	8.75
Fat.....	2.29	3.44	2.58
Cellulose.....	4.58	5.19	1.98
Non-nitrogenous extract.....	84.76	83.89	85.53
Ash.....	1.37	1.61	1.18

The figures for fat are larger than in other analyses of rice, but the difference is accounted for by the author's samples being undressed grain, whereas the samples examined by other investigators have been of the



dressed and well cleaned commercial article. *Panicum italicum*, a species of millet, is, after rice, the principal food of the poorer classes. *Sorghum saccharatum*, is an introduction from America. *Phaseolus radiatus* is a bean largely cultivated and highly esteemed; it differs but little from the European variety, *Phaseolus vulgaris*.

*Canavalia incurva*, another sort of bean, is a climber not much cultivated; the pods are about 20 cm. long, bearing 6-8 rose-colored seeds, weighing on an average 2.5 grams each; they have, when ripe, a disagreeable smell, and are generally eaten unripe. *Solanum Melongena*, or egg plant, is largely cultivated, and many varieties of it exist; it is reared from seed, and bears fruit for a long time. The specimen of fruit examined weighed 64 grams; its value as food about equals that of the pumpkin or gourd. Young shoots of the *Bambusa puerula*, and three other varieties of bamboo, are very much in favor. As soon as they appear above the earth in spring, they are dug out and eaten, dressed as asparagus. Different kinds of the sweet potato (*Batatas edulis*) are largely cultivated, and are great favorites; their long succulent stems interlace and cover the soil, keeping it moist. Their deficiency in nitrogen and the small amount of ash compared with other root vegetables, is remarkable.

*Dioscorea japonica* is of limited cultivation, and used by the wealthier classes. *Arctium Lappa*, the seeds (root?) of one variety, *Umeda Gobo*, reach an extraordinary size, a length of 1 meter, and circumference of about 30 cm. *Colocasia antiquorum*, the sweet Japanese potato, is extensively cultivated; like the common potato, it is grown from the sliced tubers. *Conophollus Konjak* is a somewhat similar plant; the root is rich in starch; it is used in the preparation of a gelatinous sort of food called konyaku, peeled, dried, and rubbed to powder; milk of lime, or the soluble salts from wood-ash is added to it, and stirred up to a stiff paste; it dries to a clammy mass. *Brassica rapa rapifera*, a turnip, is a favorite food. *Raphanus sativus* is a kind of radish which grows to an enormous size, specimens weighing 2½-3 kilos are not uncommon, and one sort is much esteemed for its sweet taste; the radish is one of the most esteemed vegetable foods of Japan.—*Landw. Versuchs.-Stat.*, 30, 42-51; *Jour. Chem. Soc.*, June, 1884, p. 674.

USE OF HELENIN.—Dr. Valenzuela has successfully treated troublesome coughs by helenin given in pill form or dissolved in alcohol. He employed it in bronchitis and phthisis, in doses of one-eighth grain in pill ten times a day, or five drops of the tincture three times a day. In every case the cough was moderated, the expectoration was lessened in quantity and became mucous, and the thoracic pains were greatly mitigated. The drug also increases the appetite and improves digestion. It is possessed of no narcotic properties. Helenin is not a new remedy, for it was known, though but little esteemed, by our fathers.—*Med. Record*, May 31. *El Siglo Med.*

## THE P AND THE P.

BY J. WINCHELL FORBES.

By which is indicated the relative importance of the pharmacist and the public. Which is which, depends. In point of number, of course it is the public with a P, but in relation to ourselves, the introductory letter of our profession, like the famous gourd vine, grows clean out of sight, when we stand *individually* in the focus of our mental microscopes, at the same time, dualizing our existence, and occupying a position at the eye-piece.

The application of time and study to the details of a given art or science, inevitably leads to more or less idealization of those details, and, no matter how primary they may be in reality, a more or less exaggerated estimate of their importance.

In fact, the more purely practical and devoid of real scientific nature they are, the greater the exaggeration, and we find a more thorough *esprit de corps* among the lower grades of mere artisans than among those in whose work mental processes and scientific considerations enter as a portion of the details. To the journeyman tailor or shoemaker his *guild* is the object of a species of worship, and, as a rule, his own individual existence is as an *unit* of the aggregation. His affection is centered upon his *trade*, not upon himself. His possible acquirements in that trade are self-limited, mechanical dexterity cannot transcend the point of practical perfection, and, as hundreds of his fellow-workmen reach that point as well as himself, he is constantly brought face to face with the fact that he is not eminently superior to his associates.

The moment that he outsteps the conventional ruts, and, introducing a mental element, becomes an *originator*, the first blow is struck at the supremacy of the *guild* over the *individual*, and the greater the proportion of *mental* action, the stronger the feeling of *individuality*, and the less disposed is he to be content with a degree of personal importance that is a common quantity for *all* units of the aggregation forming his guild.

It is rarely that *foremen* are found among the *strikers*.

Intelligent appreciation of a well-made piece of machinery, or *any* result of purely mechanical processes, is possible to the most rudimentary organizations; no knowledge whatever is required of the details of production, or even of the *utility* of the result.

The contemplation of a complicated piece of machinery will give pleasure, even when the observer cannot tell whether its mission is to grind wheat or make pins. The coloring, grouping and general execution of a painting is capable of eliciting commendation from persons having no practical knowledge of drawing, color-mixing or any point that underlies the success of the artist. Appreciation in such cases is the result of *immediate perception*, involving neither past nor present mental effort.

The results obtained by labor in arts and sciences that are distinct and wholly apart from the environments of every-day life *cannot* meet with appreciation by immediate perception, and are therefore unintelligible to the ordinary individual.

The Science of Chemistry, as well as the Art of Pharmacy, furnishes *such* results. For the appreciation of their value and significance a definite mental operation is required, not only with reference to a given case for immediate consideration, but that operation is but the continuance of *previous* mental labor, a weighing of the matter as it were in the scales of experience.

It is not to be expected, therefore, that the labors of either the chemist or the pharmacist will be correctly valued by the mass. The laborers in the abstract mathematical sciences, astronomy, physics, and those of similar nature, are isolated from the world; and the great public, while perhaps viewing their labors as but little better than air-castle building, still recognizes the fact that such matters are without the scope of their comprehension, do not "like fools rush in," and laborers in these fields never are obliged to combat what Tyndall very tersely designates "the confidence of half knowledge."

The boundary line between the workers and the "outside barbarians" is sharp and distinctly marked, and there is little or no trespassing.

In the case of pharmacy it is unfortunately very indistinct, and probably more evil results flow in our profession from "half knowledge" than in any other except that of the practice of medicine. It is this very half knowledge on the part of incipient pharmacists and doctors, as well as among the masses, that leads to the general idea, that the "druggist is half a doctor," and that the doctor is an adept in pharmacy.

No sooner does the future pharmacist succeed in making a saleable batch of *paregoric* than he feels himself qualified to prescribe for any one well enough to drag themselves to the drug store for *cheap* (?) treatment, and, if naturally of a vivid imagination, feels called upon to contribute of his experience to the columns of a journal. "Old heads" know that *new facts are scarce*, and that a column of nonpareil in an ordinary journal means a vast amount of previous work, much interlining, and many important corrections; possibly, also, a wish by the writer after posting that he had waited till he was a little more certain of his results.

Bunsen has said, "It is only the inexperienced analyst that never doubts his own work," and J. Lawrence Smith's recent protest against infinitesimal weighings is but its reiteration in another form. The managers of the various journals well know that original contributions from experienced workers are far from easy to obtain, even when *paid* for at the usual rates. Were it not for the *reputation gained* by the publication of an original investigation, containing points of immediate interest to the profession, or in some instances a desire to benefit the world, very few would take the trouble to arrange matter distributed through many pages of "notes" in a form suitable for publication. It is one thing to write an *effusion* like the present article, and quite another to put in shape one composed of *facts and their relations*. But editors must have "copy," and to them an intelligent case of *cacothés scribendi* is a God-send.

Now, I do not wish to be misconstrued. I do not in the least disparage the value of the "students'" column, but I do protest against the publication of some answers to "queries" that I have seen in the journals; in



which *ethical* questions are decided by persons whose immature age disqualifies them from forming an *intelligent* judgment. Age, and quantity of work, among the details that are under consideration, can *alone* furnish the varied experience requisite to determine a question of ethics in relation to pharmacy or *anything else*, and more than usual care should be exercised in allotting queries of that nature. But this is in some measure digressive.

The line bounding the duties of the pharmacist on one side overlaps that of the physician, and through his *trade* connection on the other side, that of the public. The inexperienced pharmacist, as well as the immature physician, finds it difficult to segregate the points in the overlap that constitute his portion, and in such cases there is a constant outstepping of province, with a feeling of resentment at aggression on both sides.

The customer at the prescription counter can see no reason why he cannot manipulate the pestle, or apportion the powders, as well as the pharmacist, and, in the case of mixtures, "anybody can pour a liquid into a bottle." This assumption of *competency* on the part of the average individual is exemplified in the demand for "English labels." The young man entering a drug store is a true member of the public, and his first and most disagreeable task is to learn that he is *not* competent. The less conceited and self-opinionated he is the sooner he becomes really a pharmacist. There are some natures, however, naturally imbued with a distaste for labor that is not productive of immediate and tangible pecuniary results. Such can never, except in cases of exceptional mental ability, rise above the level of mere tradesmen, and we have a class of apothecaries differing from the general public only in the point of greater thickness in the skin of their special knowledge. It is to these *hybrids* that our profession must charge many of the impediments placed in the way of elevating the standard of our profession. No act of theirs ever intimates to the public that the profession of pharmacy requires any more intelligence than the engineering of a peanut stand. They will cull from the various journals, or perhaps "patent outside" newspapers, formulas for a "blood purifier," cough syrup, horse powder, etc., and offer them to the world as the most "wonderful discoveries of the present age." In this connection, the efforts of certain houses at supplying apothecaries of this class with ready-made clothes (I beg pardon, I forgot; they keep drug, not tailor shops), I mean ready-made patent medicines, in form though not in name, is a direct blow at the advancement of pharmacy. This is a far greater evil than the identification of a certain remedy with a given house, as exemplified in ordinary patent medicines. It places the pharmacist directly upon the same plane as the vender of sugar or coffee, or in fact below, as he becomes simply an irresponsible dealer in sealed packages. The patent medicine man *may* have spent years of time and a large amount of money in perfecting his remedy, or he may not have spent either. He has the benefit of the *doubt*. The apothecary, however, that deals in this class of remedies has no such benefit. We *know* that the only time and thought expended is in driving a purely commercial bargain, and he is entitled to no more consideration as a scientist than the boy that sells a pound of old



iron. Such people are emphatically "of the public, publicly." And yet can we fairly blame them? No one can be blind to the fact that money makes the wheels of life revolve smoothly, and that the man with forty cents is of more consequence in the eyes of the world, and fair woman, than he who has only twenty-five. One has his choice between ignorance with strawberries and cream, and learning with oleo-margarine.

It is an unfortunate, but not to be disputed fact, that the *mere tradesmen* have been the most financially successful. The most favorable prospects exist for a newly opened Pharmacy, when a sharp dividing line is drawn between the two *P*'s, one individual dealing wholly with matters of financial nature, and another wholly with the scientific minutiae. The realization of the highest degree of perfection in the conditions, necessitates the possession by both parties, of integrity, and more than ordinary general education. The conditions existent in such a case, are realized in an eminent degree, so far as pertains to mere duties, in the large watch factories. Each operator confines himself to the performance of certain acts, and the daily repetition of these acts, under constant environments, ensures the greatest perfection in their performance. Not only that, but each operator naturally gravitates to the class of acts for which he is best fitted, and the amount of combined error, through *personal equation* is reduced. The application of these principles to the ordinary retail pharmacy, although usually difficult, does not infrequently occur, and when the possession of a high degree of ability by both parties in their peculiar provinces, is supplemented with the requisite conditions of temperament and integrity, the confidence of the general public is obtained, so to speak, without an effort, the success in a monetary sense is almost certain, and the personal relations of the parties are of the most satisfying character. The manifestations of confidence in the competence of the scientific partner, by the one manipulating the nimble sixpence, has great weight with those who bring grist to their mill; but when, on the other hand, the financial manager assumes to pass judgment upon pharmacal matters, he at once becomes an object of ridicule and diverts custom from his counter. Thinking people prefer to *take chances* of incompetency at an *unknown* pharmacist's hands, to the dead certainty of incompetence in the one they *do* know. This is an age of education, although it has not been unaptly styled the "Age of Brass," and although the mass struggling in the mad race for wealth, is always ready to claim the stray penny, and the odd half-cent, the growth of general intelligence in the public brings with it the knowledge that good articles are worth more than inferior ones, that a *shiny* five dollar gold piece will buy no more than a dull one, and that shiny or dull, a five dollar piece cannot be bought for nine silver half dollars, or even four hundred and ninety-nine copper cents. We must admit, however, that the *shiny* piece has great attractions for those unable to distinguish between gold and brass, and to carry the simile into pharmacy, there *are* instances of a "shiny" business figure-head and a *lead* pharmacist; oftenest combined in the same individual however, as an investor of capital is very quick in measuring the value of the *brain-work* that should offset his *dollars*, to detect any shortcomings, and to "secede" upon the shortest notice from an union of forces

kinetic only as regards his own portion. Years ago the ways that were dark, of the alchemistical apothecary kept the boundary line between a gaping public and his inner sanctum clear and distinct. The symbols of his art even, were looked upon with awe (scarcely with reverence), he was of the world a thing apart, and like all imperfectly understood lives, that of an apothecary was cruelly misjudged. The crude nature of scientific knowledge at the time precluded all attempts at the rational utilization of observed facts, or the framing of valid inductions, and the *misty* condition of philosophic minds rendered impossible the transmission of intelligence from those minds to the world at large.

We are suspicious *always* of the incomprehensible and the "ways" of an apothecary were eminently so to the masses. Suspicion begets dislike, and it is but a step from negative dislike to *positive* hatred, and positive hatred, not unmingled with fear, was the feeling with which the public of early ages regarded him of the crucible and gallipot. This was the primary relation existing between the two *p*'s.

Following closely the dissemination of knowledge came the appreciation of the fact that the apothecary was not so *black* as the devil said he was, the dividing line between the *p*'s gradually lost its sharp distinction, and to-day we are passing through the *secondary* stage, with a Public feeling that the apothecary is as "other men;" that the fundamental elements of his art are not solely "fire and brimstone," and that his mission is not altogether Satanic. The bow was overbent and its spring has thrown it now too far the other side; the public of years ago claimed *no* knowledge of the art or science of Pharmacy, to-day it assumes *too much*. The shop of the apothecary is no longer the dingy, smoke-discolored den of his alchemistical ancestor, his bottles are no longer labelled with arbitrary symbols of mythical deities, and his operations are no longer conducted under a veil of secrecy, nor aided and abetted by magical incantations. All is "open and above board," except *the knowledge and experience stored away out of sight in the pharmacist's brain*. The dispenser moves about confidently amid the paraphernalia of his art, while his customer, in full view of his actions, waits in an elegantly furnished room, the completion of a very simple operation, and *grumbles at the price*.

Canova once made a bust for a wealthy plebeian, and charged him three hundred florins.

"Why, exclaimed the plebeian, you made it in a week."

"True, said Canova, but it has taken me thirty years to *learn* to do it in that time."

"Five thousand francs for one song!" said an Empress; why a Marshal of France does not receive that for a month's service."

"Get a Marshal of France to *sing* for you then," said Patti.

The disposition to value every service from a basis of *manual* labor is universal, and not until the *tertiary* period is reached will the dear people recognize the fact that the difference between the *p*'s, is dearly bought *experience*, that this intangible "commodity" has a definite value, and must be paid for or it will *not be produced*. The incompetency of pharmacists may be fairly laid to the charge of those who object to allowing a fair compen-

sation for the time, labor and money expended in *producing* competency. When the average citizen awakes to the fact that skilled labor in pharmacy differs in no respect from that in other professions, or if you like, *trades*, and the general standard of education has attained a point when that average citizen will feel that his *interest* is best subserved through the employment of the skillful and experienced in all branches, then will our tertiary period be reached, and it will be Pharmacy with a big P.

CINCINNATI, August, 1884.

### THIRTY-SECOND MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

This meeting was held in the city of Milwaukee in the hall of the West Side Turnverein, and was called to order by President W. S. Thompson of Washington, D. C., on Tuesday August 26, at 3.15 P. M., when Hon. Mr. Walber, Mayor of Milwaukee, addressed the Association in words of welcome and commendation of its aims.

The annual address of President Thompson referred to the gradual elimination of the druggists' stock of many articles which in the infancy of our country were supplied from the drug store, but by the strong current of lower prices have been gradually drawn into other channels of trade. Similar causes now influence a particular class of medicines—proprietary, but nevertheless medicines—the sale of which forms a large item of the business of many druggists. Without considering the temporary expedients suggested, President Thompson sees the ultimate solution of the problem either (1) in the pharmacist maintaining his present position as purveyor of medicines by furnishing this class as cheaply as may be done by others; or (2), in abandoning their sale to those who may be willing to supply them at lower rates, and in confining himself exclusively to the technical affairs of pharmacy. The latter course would lead pharmacy to that elevated plane where it should be firmly placed. But the chief evil of the situation is the superabundance of drug stores. On the other hand it is evident that pharmacy throughout the country is continually progressing towards more elevated standards. The President then made various suggestions in regard to the internal affairs of the Association, and to the use of the special funds the interests of which are at its disposal. Referring to the history of the organization, and to the clause of its constitution which declares one of the principal aims to be "to improve and regulate the drug market by preventing the importation of inferior, adulterated and deteriorated drugs and by detecting home adulterations;" the President made suggestions looking towards a more systematic course for disseminating information as to the quality of commercial drugs and for exposing fraudulent adulterations with the view of preventing them.

The suggestions of the President were referred for consideration and report to a committee consisting of Messrs. W. J. M. Gordon, H. B. Parsons and Alonzo Robbins.



All members of the medical and pharmaceutical professions present in Milwaukee were invited to attend the sessions. The exhibition room being directly above the meeting room the deliberations were interfered with by the walking of the visitors; the exhibition room was therefore ordered to be closed during the subsequent sessions.

The report on credentials showed that delegates were present from nine Colleges of Pharmacy, five Alumni Associations, twenty-three State and ten county or city Pharmaceutical Associations. One member of each of these delegations was appointed to serve on the Nominating Committee and a member from each of two other Associations, who had failed to send credentials, was added by special vote. From the Association at large Messrs. A. Nattans, of Washington, D. C., F. W. Sennewald, St. Louis, J. C. Huber, Fond du Lac, Wis., W. P. Plummer, Bradford, Ill., and J. Jesson, Muskegan, Mich., were appointed as additional members.

The Committee on Exhibits was constituted as follows: W. McIntyre, Philadelphia, W. H. Bergman, Washington, D. C., J. Ingalls, Macon, Ga., Geo. H. Schafer, Fort Madison, Ind., and N. A. Kuhn, Omaha, Neb.

The names of sixteen candidates for membership were announced and the minutes of the Council meetings held since last year were read and approved. The report of the Publishing Committee stated the total cost of publishing and distributing the Proceedings of the past year to be \$2,924.75. The report of the Committee on Membership announced the decease of twelve members and one honorary member since the last meeting. The Committee on Legislation reported that during the past year pharmacy laws had been enacted for the State of Ohio, for Erie county, N. Y., and for the State of New York, excepting New York city and the counties of Kings and Erie in which somewhat similar laws are already in force, so that in the State of New York four pharmacy laws are in existence which differ from one another in several important details. The report also showed that a national pharmacy law could not be enacted under the Constitution of the United States, except so far as the government service was concerned. A bill giving a commission and the rank of second lieutenant to the apothecaries of the army and navy has never been before Congress, and the report suggested the appointment of a special committee for this purpose.

The reports of other committees not being present, the Association adjourned until the next morning.

#### SECOND SESSION, Tuesday Morning, August 27.

After the reading and approval of the minutes the following officers were elected for the ensuing year: President, John Ingalls, Macon, Ga.; Vice-Presidents, John A. Dadd, Milwaukee, Henry Canning, Boston, and C. F. Goodman, Omaha, Neb.; Treasurer, Charles A. Tufts, Dover, N. H.; Permanent Secretary, J. M. Maisch, Philadelphia; Reporter on the Progress of Pharmacy, C. L. Diehl, Louisville; Committee on the Drug Market, M. N. Kline, Philadelphia, Chairman; W. A. Gellately, New York, E. W. Cutler, Boston, D. Myers, Cleveland, Ohio, W. Simpson, Raleigh, N. C.; Committee on Papers and Queries, J. U. Loyd, Cincinnati, Chairman, G. W.



Sloan, Indianapolis, W. W. Bartlet, Boston; Committee on Prize Essays, C. L. Diehl, Louisville, Chairman; H. B. Parsons, New York, Emil Scheffer, Louisville; Committee on Legislation, J. M. Maisch, Philadelphia, Chairman, S. A. D. Sheppard, Boston, E. Bocking, Wheeling; Members of Council for three years, W. J. M. Gordon, Cincinnati, J. L. Lemberger, Lebanon, Pa., W. S. Thompson, Washington, D. C.

The minutes of the Council meeting were read and approved, and eleven candidates for membership were proposed.

Prof. Diehl read the introductory portion of the report on the progress of pharmacy. Mr. P. C. Candidus, Mobile, was appointed a member of the Committee on Exhibits in place of Mr. Ingalls. It was stated that certain articles had been placed on exhibition which should have been excluded under the by-laws, or about which it was doubtful whether they could be admitted. The Committee was requested to enforce the rules and report doubtful cases to the Association. Local Secretaries were instructed, hereafter to embody into their circulars to exhibitors, Sections 1 and 2 of Art. V.

Mr. Ebert read the report of the Committee on the proposed meeting in California, discussion on which consumed considerable time. The report together with an invitation received from New Orleans was referred to a Committee on the time and place of the next annual meeting, consisting of Messrs. E. H. Sargent of Chicago, J. P. Remington, of Philadelphia, and P. C. Candidus of Mobile.

The Committee on Prize Essays reported that none of the papers presented last year appeared to be entitled to the Ebert prize. Mr. Robinson presented a resolution favoring the repeal of the tax on alcohol, which was referred to the Committee on the President's address.

The report of the Committee on Entertainments was read and referred to a Committee, consisting of Messrs. E. H. Sargent, Chas. Eberle, and G. W. Sloan, for consideration and report.

The Committee on unofficial formulas read a report, presented a number of formulas and made several suggestions; the whole subject was again referred to a special Committee consisting of Messrs. Chas. Rice, P. W. Bedford, W. P. DeForest, S. J. Bendiner and A. Tsheppe.

The Association then paid a visit to the exhibition room and adjourned until Thursday morning.

#### THIRD SESSION, Thursday Morning, August 28.

The Association met at 10 o'clock. The minutes of the previous meeting and of the Council meeting were read and approved. The Committee on Papers and Queries made a report favoring a change in the method for obtaining papers in answer to queries, the latter to be communicated to all the members, and subsequently printed in the Proceedings, the names of those who accept one or more thereof to be retained by the Committee.

The Committee on time and place of the next meeting reported in favor of meeting in New Orleans, on Monday, April 9, 1885, and did not consider it desirable at this time to recommend meeting in California. Much discussion was had on this report, Montreal, Newport, R. I. and Pittsburg being mentioned as desirable places for meeting, and the Association fin-

ally decided to meet in Pittsburgh on the second Tuesday of September, 1885.

A resolution was again adopted ordering the exhibition room to be closed, and a resolution was offered by Mr. Sloan, aiming at devoting nearly all the time of the sessions to the reading and discussing of papers, and, in accordance with the by-laws, referring all business matters to the Council, upon whose report they are to be decided, or at an hour specially assigned by the Association. This resolution was referred to the Council to report a by-law defining the manner in which business may be brought forward. Eight candidates for membership were proposed.

The first paper was now read by Mr. W. W. Bartlet, *On Opium Assays*. The processes experimented with were those of the Pharmacopœias of the United States, Germany, and Great Britain. Three samples of powdered opium were assayed and yielded respectively of morphine :

1. 12.50 per cent., U. S.	8.50 per cent., Ger.	5.12 per cent., Brit.
2. 12.48 " " "	10.50 " " "	8.25 " " "
3. 13.40 " " "	9.25 " " "	3.42 " " "

The conclusion arrived at by the author is that the present U. S. Pharmacopœia process is by far the most definite as to details, yields by far the most morphine, and hence exhausts the opium more thoroughly than the other processes. In the discussion which followed, Prof. Good said that instead of powdering commercial sal ammoniac as suggested by Mr. Bartlet, the salt may preferably be granulated from a hot solution. Regarding the morphine strength of opium it was stated that the British Pharmacopœia required at least six per cent. from crude opium, while the twelve and ten per cent. required by the United States and German Pharmacopœias refer to powdered and dry opium.

Professor Power next read a paper, on "Hydrastine," in which its history and process of preparation are described. Prof. Power finds the alkaloid insoluble in water and petroleum benzin, but soluble in dilute acids, in 1.75 parts of chloroform, 15.7 parts of benzol, 83.46 parts of ether, and in 120.27 parts of alcohol at 15° C. The alkaloid in solution is left rotating, and its most characteristic test appears to be sulphuric acid and ammonium molybdate, with which it produces an olive green color. Ultimate analysis gave results agreeing with Mahla's results,  $C_{22}H_{23}NO_6$ . The alkaloid crystallizes in four-sided prisms, which probably belong to the ortho-rhombic system. The sulphate of hydrastine contains 11 per cent.  $H_2SO_4$ , and the gold double salt 16.78 per cent of gold. Salts with organic acids could not be obtained; a commercial soluble citrate of hydrastine was an amorphous yellowish powder, and contained 1 mol. of alkaloid to 15 mol. (or 8 parts) of citric acid. Hydrohydrastine and ethylhydrastine were likewise prepared; but xanthopuccine could not be procured. In regard to the latter alkaloid, Prof. Maisch said that he had seen Mr. Lerchen's results in 1878, and while in its behavior it resembled berberine to some extent, yet in some reactions it was quite distinct, and it was free from hydrastine. Attention was directed by Mr. Ebert to various salts of berberine which certain manufacturers persist in calling hydrastine, causing confusion since the latter

alkaloid has likewise been used in medicine. Prof. Lloyd stated that hydrastine had been an article of commerce only for about five years, and it became necessary to designate it as "the white alkaloid." It is used in diseases of the mucous membrane and of the eyes, while berberine is a tonic and antiperiodic. Prof. Lloyd also said that he had not succeeded in obtaining crystallizable hydrastine salts. The dark green color which Mr. Hallberg said berberine shows with iron salts, according to Prof. Power, does not appear with pure berberine. Regarding pharmaceutical preparations, Prof. Power stated that with the aid of nitric acid, hydrastine could be combined with bismuth in solution. Mr. Kennedy said that 1 or 2 grains of the alkaloid hydrastine, with the aid of 4 grains of ammonio-citrate of bismuth, would dissolve in an ounce of glycerin and 1 or two ounces of water; and Dr. Menninger and Prof. Good stated that the application of hydrastis to mucous membranes was increasing, the fluid extract being prescribed properly diluted.

Mr. J. W. Colcord read a paper on *Canutillo*, which is recommended by Dr. S. Gleeson, of San Antonio, Texas, as a valuable remedy in syphilitic complaints. The fluid extract is dark red brown, and has a sweetish aromatic and astringent taste. The leafless branches, unaccompanied by flowers, were examined at Harvard University, Cambridge, and pronounced to be derived from an *Ephedra*, probably *E. trifurcata*, which is now common on the Southern borders; all our species of *Ephedra* are popular local remedies in syphilitic complaints. Dr. Menninger suggested that the effects were probably due to tannin. The paper elicited some discussion on the introduction of new remedies in general, many of which owe their virtues wholly or partly to tannin, and it was urged that such investigations should be made as early as possible; the search for remedies used by the Indians was mentioned, and the value of many plants was pointed out as remedies suitable for certain localities, and often preferable to such obtained from a distance.

A paper by Mr. S. G. Ade treated of the *fungoid growth in diluted phosphoric acid*, which is sometimes observed, and is by the author believed to cause the deterioration of the solvent power of the acid. A microscopical drawing of this fungoid, or more properly algaecious growth, was furnished. The author not being present, inquiries on several points suggested by his paper could not be answered. Prof. Remington had frequently noticed these conserve, not only in dilute phosphoric acid but also in dilute acetic and other acids, and even in distilled water; they do not appear in the strong phosphoric acid at present officinal, which, therefore, serves well for making the dilute acid in small quantities; the same or a similar growth appears to be more injurious to alkaloidal solutions. Mr. L. E. Sayre mentioned a similar formation in a *solution of eserine*, in regard to which he had been informed by Dr. Formad that the alga did not feed upon this alkaloid so much as it did upon other substances present. Prof. Oldberg had seen the plant grow in diluted acid prepared from the concentrated phosphoric acid, while in officinal diluted phosphoric acid it did not make its appearance. Prof. Maisch suggested that the presence of alkalies favors the growth, and that a deterioration of the acid could take place only through



a combination with it of alkali, obtained from the glass, or of ammonia, generated by or contained in the plant, but that the phosphoric acid could not disappear. Mr. Ebert had noticed a similar growth in a *solution of citrate of iron and quinine*, which produced griping and diarrhoea, while a similar solution prepared directly from the salt was free from this objection. Mr. R. J. Brown stated that also solutions of *citric acid and of strychnine* were liable to produce the same growth, and suggested that all such solutions kept on hand be frequently examined; and Prof. Oldberg suggested that solutions found in such conditions are unfit for use.

An adjournment was then had until 4 o'clock P.M.

#### FOURTH SESSION, Thursday Afternoon, August 28.

The first business done at this session was the reading of the report of the Committee on the President's address; the propositions involving certain changes of the by-laws, the consideration of the report was laid over until the fifth session. A report was also read on the proposition to abolish the tax on alcohol; the Committee favor the abrogation of the tax upon such spirits only which are used for medicinal or mechanical purposes. This view was also adopted by the meeting, and the subject was referred to the Committee on Legislation.

*A Set of Standard Dimensions for Simple Percolators* was the title of a paper read by Professor Oldberg. Starting with pointing out the objectionable features of the ready made percolators at present obtainable, the conclusions arrived at by the prominent investigators of percolation are next summarized and may be briefly stated as follows:

1. Simple percolation is best suited for the pharmacist operating on a small or moderate scale, while re-percolation can be profitably carried only on a comparatively large manufacturing scale.
2. Properly constructed simple percolators are preferable in point of economy and efficiency to the various patented contrivances.
3. Tall and narrow percolators best insure the proper exhaustion of the powder by means of simple percolation.
4. Percolators should be packed nearly full, and, therefore,
5. The quantity of the drug should be made to suit the percolator.

This necessitates a sufficient variety of sizes of percolators, to be adapted for the quantities of tinctures, fluid extracts, etc., usually prepared by the pharmacist.

On these principles the author has constructed a set of percolators, the dimensions of which have been adopted by the Chicago College of Pharmacy, and which will be made of glass, by Messrs. Whitall, Tatum & Co. of Philadelphia. The dimensions are:



Numbers.	Approximate capacity.		Length of body.		Internal diameter at the top.		Internal diameter of body at the shoulder.		Depth of shoulder.		Length of rubber tube.	
	Cc.	U. S. fluid measure.	Millimeters.	Inches.	Millimeters.	Inches.	Millimeters.	Inches.	Millimeters.	Inches.	Millimeters.	Inches.
1.....	90	3 fl. oz.	150	5.99	30	1.181	25	.984	4	.157	200	7.87
2.....	150	5 "	180	7.09	36	1.417	30	1.181	6	.236	240	9.45
3.....	240	8 "	210	8.27	42	1.654	35	1.378	8	.315	280	11.02
4.....	360	12 "	240	9.45	48	1.890	40	1.575	10	.394	326	12.60
5.....	530	18 "	270	10.63	54	2.126	45	1.772	12	.472	360	14.17
6.....	740	25 "	300	11.81	60	2.362	50	1.968	14	.551	400	15.75
7.....	1,240	42 "	360	14.17	72	2.835	60	2.362	16	.630	480	18.89
8.....	1,960	66 "	420	16.53	84	3.307	70	2.756	18	.709	560	22.05
9.....	3,000	100 "	480	18.89	96	3.780	80	3.150	20	.787	640	25.20
10.....	3,780	8 pts.	540	21.25	108	4.252	90	3.543	22	.866	720	28.35
11.....	5,700	12 "	600	23.62	120	4.724	100	3.937	24	.945	800	31.50
12.....	7,600	16 "	660	25.98	132	5.197	110	4.331	26	1.024	880	34.65
13.....	9,850	21 "	720	28.35	144	5.670	120	4.724	28	1.102	960	37.80
14.....	12,500	26 "	780	30.71	156	6.142	130	5.118	30	1.181	1,040	40.95

The total depth of each percolator is equal to five times its large, and to six times its small diameter. The exit tube of Nos. 1 to 4 is 30 Mm. (1.181 inch) long, 10 Mm. (.394 inch) internal diameter at the throat and 12 Mm. (.472 inch) diameter at the mouth; the corresponding dimensions for Nos. 5 to 14 are 35 Mm. (1.378 inch) 13 Mm. (.512 inch) and 15 Mm. (.591 inch). The mouth is closed with a perforated rubber stopper containing a glass tube of 3 Mm. ( $\frac{1}{8}$  inch) internal diameter, to this is attached the rubber tube having 5 Mm. ( $\frac{1}{4}$  inch) internal diameter, and at the farther end another glass tube. The rubber tube may be lowered or raised to regulate the flow of the percolate.

Prof. Remington said that old-fashioned percolators could still be used for such preparations requiring a comparatively large amount of menstruum, as for most tinctures. As to large glass percolators, they are apt to break in consequence of the difficulty of annealing; Prof. Lloyd had similar experience, but Mr. Hallberg said that he had a number of glass percolators thirty-six inches high in use for three years, and had not lost one since he adopted the precaution of surrounding them with broad and thick bands of India rubber before putting them into the supports. Mr. L. E. Sayre suggested that maceration in glass percolators be conducted, not by closing the lower orifice, but by covering the well ground top with a tightly fitting plate, so that the air could pass out below as the menstruum descended.

The next paper read was by Prof. Virgil Coblenz on *Commercial Bromide of Potassium*. The author had examined two samples each, purchased at different times of the salt prepared by six American, one English and one German manufacturer. Five of these samples are described as being neutral, while the remainder had a more or less alkaline reaction, and caused a cloudiness with lime water. By volumetric estimation the alkali was found to vary between .01 and 3.10 per cent. of carbonate. The solubility of one part of the salt in boiling water is given as varying between .907 and 1.11 parts of the latter; and in alcohol at 15° C. between 114.2 and 199.5 parts. Traces of bromide were found in five samples, iodide in one sample, chloride in all samples, one being determined as 8.6 per cent., and sulphate in four samples. One sample contained a trace of nitrate, ten samples indicated the presence of traces of sodium and the moisture varied between .2 and 1.5 per cent., while the weight of silver precipitate obtained from 1 Gm. of the salt varied between 1.48 and 1.990 Gm. (1.579 Gm. U. S. P.)

Mr. Macmahon made some remarks about the last meeting of the National Wholesale Druggists' Association, and another Committee, of which Dr. Enno Sander, of St. Louis, is Chairman, was appointed to attend the next meeting. Three candidates were proposed for membership.

Mr. C. S. Hallberg read a paper entitled *Simultaneous Fractional Percolation, with Notes on some Fluid Extracts*. The proposed process resembles re-percolation, but each of the four portions of the powder is in the beginning moistened with menstruum. One portion is then exhausted and the first percolate, equal to 20 per cent. of this portion, or 5 per cent. of the whole weight of the drug is reserved, the remaining percolate being used for the exhaustion of the second portion, from the percolate of which the same quantity as before is reserved. The third portion is treated precisely as the others, and from the fourth portion a total of 85 per cent. of the entire percolate is obtained, which being four times the weight of this portion of the drug, is amply sufficient for complete exhaustion. In the case of very bulky drugs, the percolate reserved from the first three portions is 10 per cent. each of the total amount to be obtained, so that the fourth portion yields 70 per cent. of percolate, or 3½ times the weight of the last portion of the drug.

The next paper read was a paper by Dr. H. T. Cummings, entitled *A Study of Percolation*. It was a criticism of a paper bearing the same title, which had been read by Mr. Rosenwasser at the meeting of 1882. The paper was referred to the publishing Committee.

The Treasurer's annual report which was now read showed the total income of the general fund during the past year to have been \$10,518.95, and the disbursements \$4,258.38, leaving a balance of \$6,260.57 in the hands of the Treasurer. Acting on the suggestion of the Treasurer, the Association ordered that \$316, which amount had been donated by various members in past years, be withdrawn from the general fund and added to the life membership fund.

The motion that \$500 be placed at the disposal of Council for the purpose of making examinations of drugs and chemicals in the manner suggested

by President Thompson, was referred to the Council to report thereon next year.

A motion coming from the Committee on Legislation, that a special Committee of three be appointed to present to Congress a bill granting a Commission to apothecaries of the army and navy, was passed.

A resolution had been sent by Prof. Prescott. It provides for appointing a special Committee of three to report upon the most feasible and suitable legislation to secure a sufficient statement of the composition of proprietary medicines to be put upon each package of the same, and upon the most favorable and efficient action in regard to this matter. Prof. Prescott and Drs. Rice and Hoffmann were appointed the Committee.

The report of the Committee on the suggestions by the Entertainment Committee was read. It created considerable discussion and was finally recommitted to be disposed of at the next session.

#### FIFTH SESSION, Friday Morning, August 29.

After the reading and approval of the minutes of the preceding sessions and of the Council meeting, the last mentioned report somewhat modified, was again read, and was then adopted, and Mr. H. W. Atwood, of New York, was elected Chairman of the Entertainment Committee for the ensuing year.

The reading of papers was then resumed, the first one presented being by Mr. G. W. Kennedy, *on Cream of Tartar as sold by pharmacists and by grocers*. Of 14 samples obtained from pharmaceutical stores in 13 different cities, only one sample was found adulterated, while the remaining 13 contained no impurity except calcium tartrate, which, however, reached 12 per cent. in one of the samples. Corresponding with these in purity were 6 out of the 13 samples purchased at grocery stores, the remainder being adulterated with chalk, alum, clay or starch.

Amendments to the by-laws coming up under the recommendations of President Thompson were agreed to; thereby the salary of the Permanent Secretary was increased to \$750, and the requirement to return the certificate of membership by members relinquishing their connection with the Association was abolished. Notice of an amendment was given that the Treasurer's salary be increased to \$600.

A paper written by Mr. H. B. Parsons *on the Water of Hydration in Commercial Sulphate of Quinine* showed that it amounted in

1.	16	samples of an American brand	to 13.72 per cent. average.	
2.	184	" " "	" "	12.61 " "
3.	12	" " a German	" "	12.32 " "
4.	634	" " "	" "	14.09 " "
5.	169	" " an Italian	" "	14.36 " "
<hr/>				<hr/>
	10.15	" examined,		13.84

The first and third lots varied most; No. 2 approximated very closely to  $6H_2O = 12.53$  per cent., while Nos. 4 and 5 uniformly contained about  $7H_2O = 14.45$  per cent.; not a single sample contained over 15 per cent.

The author takes occasion to repeat a suggestion which has been repeatedly made, that the stable sulphate containing  $2H_2O = 4.6$  per cent. be made officinal in the future.

Mr. Henry Biroth exhibited a *new poison case*, constructed by him, and read a description of it. The case is divided into 10 compartments, two of which are labeled morphine and five others respectively opium, cyanides, corrosive sublimate, arsenic and strychnine. These compartments contain the various preparations designated, bottles of different size, shape or color being used. The three remaining compartments are intended to contain the strongest acids and poisonous tinctures, alkaloids and glucosides.

Considerable discussion was had on this paper, nearly all of the speakers agreeing that poisonous articles should be isolated, but as to their proper arrangement much diversity of opinion was presented, some preferring a systematic arrangement, while others favor the opposite course, as requiring additional care and inducing the habit of consulting the label. The enclosing of tincture bottles in tin cans was also recommended, as an additional safeguard, and on the other hand it was contended that an additional source of danger was thereby created, arising from the misplacing of the outside boxes or cans. The possibility of mistakes occurring, not through ignorance but from overwork, was likewise illustrated.

Mr. Biroth exhibited a specimen of an article which thirty years ago was sold under the name of *Pepsau*, and was prepared near Jamestown, Chatauqua county, N. Y., by a man known as "Crazy Owen." The circular accompanying the bottle reads as follows :

"PEPSAU.—For the cure of Dyspepsau, Jaundice, Liver Complaint, together with all diseases arising from a disorganization of the Stomach. This, I believe, is the Gastric Juices of the Stomach of the Ox, producing the Gastric Juice required by man to digest his food. Prepared by Eben Owen ; by no other, I believe, in this world.

"*Directions for Using.*—Take a small half teaspoonful, fifteen minutes before eating, in a half gill of cold water. My advice is, to eat light suppers.

"Prices for Pepsau, by the gross or more, eighty cents per bottle ; retail, one dollar a bottle. This is got up under prayer, and will do good, I believe.

"April 16, 1853.

EBEN OWEN."

A paper by Mr. Edward Goebel, on *Cinchona Assay* was read, in which slight modifications of the U. S. Pharmacopœia process were suggested. Using 15 Gm. of the powdered bark, it is treated with lime as directed in the officinal process, and, after digesting with 150 Cem. of alcohol, 100 Cem. of the tincture, representing 10 Gm. of the bark, are filtered off. Instead of finally drying the precipitated alkaloid in a capsule, it may be dried with care and weighed in a tared filter.

Prof. Lloyd read a paper entitled *Precipitates in Fluid Extracts*, which is printed in full on p. 449 of our last number. In the present number, on page 508, we publish, in a very condensed form, the results of some older investigations on the subject of capillarity. Mr. Vogeler stated that the separation of water from saline solutions by means of absorbent material had been known for a long time.



A paper by Mr. Henry MacLagan on *Mercurous Iodide* reported proofs that this salt when pure is yellow, and that when of a green color this is due to the presence of uncombined metallic mercury, the green tint being deeper in proportion as the amount of the latter increased.

In a paper sent by Prof. O. A. Wall, the question was discussed: To what extent, if at all, is it proper for the physicians to specify in their prescriptions the *particular make of preparations* prescribed by them? The author's views are summarized thus: The physician should specify to the extent he may *know*, that proper remedies are dispensed, either by directing the patient to go to a certain drug store, or by specifying a particular preparation with which he is familiar and in which he has confidence. Mr. Hallberg did not agree with this conclusion, but claimed for the pharmacist, who understands his business, the privilege of using his own judgment in supplying the physician's wants to the best of his ability.

Mr. Kline read a portion of the report of the Committee on Drug Market, and more particularly gave an interesting account of the condition of the market and the causes influencing the supply and price of cinchona bark and of quinine.

*Rhubarb, its history, habitat, culture and preparation, with reference to its cultivation in the United States*, was the title of a paper presented by Mr. J. W. Colcord. Regarding cultivation, the author says that "given the proper soil, I have no doubt but that rhubarb culture in this country can be made a success; whether it would prove remunerative from a financial standpoint, would require repeated and long-continued experiments; my impression is that it would."

A paper by Mr. C. W. Phillips, on *Compound Emulsion of Copaiba*, details the manipulation for obtaining a perfect emulsion containing copaiba ʒij, gum arabic ʒj, saccharated pepsin ʒj, and tinct. chloride of iron ʒij in a two-ounce mixture. An emulsion is first formed with the first three articles and about one-third of the water, the remaining water being used for diluting the tincture of iron, and this mixture is then added to the emulsion, the whole being well shaken.

Mr. H. MacLagan had sent a paper entitled *Modification of Kerner's Test*, the object being to obtain reliable results regardless of variations in temperature. The modification consists in keeping an excess of pure quinine sulphate under water, so as to have a saturated solution of it always at hand. The salt to be tested is then treated in a similar manner, and both solutions are then to be tested in the usual manner with ammonia water at the same temperature. In the same way a solution may also be made from pure quinine containing 1 or 2 per cent. of cinchonidine, so that the absolute or relative purity of the sample may be readily ascertained by comparison.

Dr. A. W. Miller had made inquiry into the alleged commercial supply of *artificial oil of gaultheria*, and came to the conclusion that the present high price of salicylic acid would prevent the substitution of the artificial for the natural oil, unless the price of the latter should advance to \$3.00 or more, but that the firm controlling Kolbe's patent might possibly with advantage dispose in this manner of an excessive production of the acid.

*The prevention of brittleness in plasters* was discussed by Mr. H. W. C. Martin, who sought to imitate the softening action of glycerin by the use of castor oil. A plaster made of castor oil 1 part, olive oil 8 parts, oleic acid 2 parts and litharge 6 parts was hardly up to the requirements of the Pharmacopœia in regard to its solubility in oil of turpentine, but with the thermometer ranging between summer heat and below zero it remained firm, yet pliable, without being brittle or excessively sticky.

The reading of the papers came to a close with *Cleanliness in Pharmacy*, which was discussed by Mr. G. G. C. Simms.

A number of resolutions of thanks were passed; Mr. George A. Kelly was elected Local Secretary; a resolution was passed that in the Proceedings the discussions on pharmaceutical subjects alone should be published, and the Association finally adjourned to meet again in Pittsburgh on the second Tuesday of September, 1885.

We cannot make room for a detailed statement of the attentions paid to the visitors by the local pharmacists. There was no banquet, but everybody was pleased with the cuisine of the Plankinton; nor was there a grand concert or ball, but the lovers of good music had occasion to enjoy a rare treat from amateurs, and those fond of terpsichorean amusement were likewise gratified in the arcades of the Plankinton. A drive through different parts of Milwaukee, visits to various industrial establishments, prominent among which were the breweries for which the Cream City is famous, attendance at a comic opera in Schlitz's Park and a steamboat excursion on Lake Michigan entertained the visitors. That the inner man was not neglected and that many visitors were gratified by the hospitality extended by families, need merely be mentioned. After the adjournment numerous parties extended their trips to different lakes, to Waukesha, Tonyawathee on Lake Monona near Madison, where the capitol and University of Wisconsin are located, to the dells of Wisconsin, to St. Paul, Minneapolis and other places of interest.

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## THE BRITISH PHARMACEUTICAL CONFERENCE.

In August of the present year the British Pharmaceutical Conference has attained its majority, but it can hardly be said that the gathering at Hastings, under the presidency of Mr. John Williams, with which it completed its twenty-first year, was suggestive of an excess of virility. It is true that, as remarked by the President, the meeting took place under exceptional circumstances. For the second time in the history of the Conference it had decided not to follow the lead of the British Association in respect to the locality it would visit, and the occasion was also marked by the initiation of an experiment in the shape of a "self-denying ordinance." How far either or both of these conditions affected the result, we are not prepared to say; we merely chronicle the fact that notwithstanding the attractions of Hastings, and its easy accessibility to the metropolis, the attendance of members was unusually small. We are afraid, therefore, that if, as indicated in the Annual Report, the Executive Committee is disposed to regard the present meeting as a test of what would take place were the Conference

to cease to assemble annually in the same town as the British Association, a reform that we are inclined to think a desirable one will be indefinitely delayed.

The proceedings were commenced at half-past ten on Tuesday morning, August 12, in the Assembly Room of the Castle Hotel. Apart from the announcement that Mr. Bengier and Mr. Ekin, the former after serving thirteen years as one of the Honorary General Secretaries and the latter after seven years as Treasurer, had expressed their intention not to accept again the respective offices, the principal feature in the annual report was the allusion to a vigorous effort that had been made to extend the membership in India and the colonies. We think that so far as this attempt may prove to be successful it will be a clear gain to the interests of pharmacy, and therefore to the Conference. But it must not be forgotten that an accession of members residing thousands of miles from the ordinary itinerary of the Conference, although it may swell the numbers, is not likely to furnish recruits to more than a nominal extent to the most characteristic portion of the operations of the Association, the partly scientific, partly social meetings, such as the one held on the south coast during the past week. The Treasurer's report showed that once more the expenditure had exceeded the receipts. This, in reply to a question put by Mr. Bottle, was attributed to the expense of distributing copies of the address delivered by Professor Attfield last year, and to the cost of a special "whip" that had been made to secure new members at home and abroad. It is not quite apparent, however, from the accounts presented, how the whole of the deficit—about £150—can have been due to the causes mentioned, and had it not been for the statement made by one of the Honorary General Secretaries we should have inferred that there had really been an "outrunning of the constable" to some extent. However this may be, we believe that many of the members will be pleased to observe that that item is not likely to occur again in the accounts, and that the broadcast touting which had come to be looked upon as a periodical event is to be abandoned in favor of an appeal simply to such persons as may pass the examination qualifying as a chemist and druggist each year.

The Address of the President was not conceived in a very ambitious spirit, and the company who assembled to hear it was not so numerous as some other meetings on similar occasions in previous years; but the delivery of it was none the less a great success. The President was not decoyed by the example of his predecessor, on two separate occasions, into entering the field of pharmaceutical politics, which has always been held at meetings of the Conference to be tabooed ground when any one of less degree than the Chairman has proposed to enter it. The principal theme on the present occasion was a few points which seemed to have a bearing, more or less remote, upon those branches of science with which pharmacists, as a body, are particularly connected. Starting with a reference to the consequences following upon the discovery of the tinctorial properties of some derivatives from coal tar, obtained during an abortive attempt to build up quinine, the speaker illustrated the way in which succeeding investigators, whilst endeavoring to wrest similar secrets from Nature, have acquired knowledge concerning various natural compounds which pharmacists have to manipu-



late that has led to more or less successful attempts to build them up artificially. Then came the important question whether the artificially combined compounds produced the same medicinal effects in the human system when administered as those they were designed to represent, and therapeutists, no less than pharmacists, will note with interest that a man of such wide practical experience as Mr. Williams is not prepared at present to answer that question in the affirmative. From the vegetable principles to the plants in which they are formed was but a step, and in a few sentences it was made evident how what might appear to be most abstruse researches upon physiological botany may have a very important bearing upon the operations of practical pharmacy. In a like manner, the successful liquefaction of gases that had been looked upon as refractory was, after a parenthetical reference to the relatively narrow limits of temperature within which the life of organized beings is possible, made to have a business application that will probably be suggestive to many of the hearers. The new pharmacopœias, the justice of the claim of pharmacists to be officially represented on future committees charged with the compilation of such works in this country, and the compilation of an International Pharmacopœia were the topics to which the latter part of the Address was devoted, the treatment of each being such as commended itself to the approval of the audience, as we think it will also to most who make their first acquaintance with the Address by reading it. We may add that although through a slight misunderstanding the comments at the conclusion of the Address were unusually few, Mr. Williams had ample reason to be gratified by the manner in which the Conference subsequently created an opportunity for expressing an opinion respecting it.

The reading of communications commenced as usual with reports from gentlemen who had undertaken the investigation of various subjects, partly at the expense of the Conference. We shall simply refer here to the most salient features in them. The first two papers were from Mr. W. Elborne, and were upon the subject of English Rhubarbs. It would appear that English-grown "rhubarb" from *Rheum officinale*, the plant which was first brought to Europe about sixteen years ago (*Pharm. Journ.* [3], iii., 301), has now taken its place side by side in commerce with that from *R. rhaponticum*, from which it may be distinguished upon fracture by the comparatively black color of the veins imbedded in a white parenchymatous tissue. The excessive development of this tissue, observed in the earlier experimental samples of this variety by Mr. Holmes (*Pharm. Journ.* [3], vii., 301), was no doubt due to "high cultivation," and it has been found that with a slower growth the roots become more dense, and when prepared are of a richer and darker color. One of the reports was devoted to some historical, botanical, and microscopical notes on English-grown rhubarb, and the method of its preparation, and the other gave the results of a series of analysis showing to a certain extent the constituents of samples of English "officinale" and "rhaponticum," East Indian and the old-fashioned Russian rhubarbs. It was mentioned that the production of English rhubarb now amounts to twelve thousand pounds weight yearly.

Mr. A. W. Gerrard presented a final report upon the alkaloidal value of



wild and cultivated belladonna plant. Summing up the results of his researches, he stated that they had shown that wild belladonna generally contains more alkaloid than the cultivated, though not to an important degree, but that the cultivated plant is the better suited for the manufacture of pharmaceutical preparations on account of its greater uniformity. He had found the leaf to be the part of the plant richest in alkaloid, the root, fruit, and stem being next in order. He therefore suggested that preparations of belladonna leaf should supersede those of the root, except in the case of the liniment, and he also advocated the introduction of a formula for an alcoholic extract into the British Pharmacopœia. With regard to the time of collection, Mr. Gerrard is of opinion that the growth of the leaf does not affect the proportion of alkaloid in the root and that the two parts may, therefore, be collected without disadvantage at the same time. Closely connected with the same subject was the report of Messrs. Dunstan and Short upon the "Estimation of the Alkaloids in *Atropa Belladonna*." This was a summary of a paper recently read before the Pharmaceutical Society, describing a process in which the root is exhausted by hot percolation with a mixture of chloroform and absolute alcohol, the alkaloids extracted from the percolate by shaking it with water and then withdrawn from the aqueous solution by agitation with chloroform after the addition of ammonia. Next Mr. Hasselby recounted the steps in an attempt to carry out in the garden attached to his house in Hastings a suggestion made by the President of the Conference last year that pharmacists should as far as possible grow their own supply of vegetable drugs. His experiments had been made upon belladonna and henbane, the former yielding tolerably good results, whilst the latter had not given so much satisfaction. The discussion that followed the reading of these three papers turned principally upon the subject of cultivation and the effect of it upon the active principles contained in plants; but Mr. Gerrard also mentioned some experiences met with in the cultivation of henbane that have led him to suspect either the existence of three varieties or of a hybrid between the two at present recognized. The suggestion as to the substitution of leaves for the root of belladonna in making pharmaceutical preparations did not appear to be regarded with favor by Professor Redwood, who thinks the leaves are much more liable to undergo deterioration than the root.

On resuming after luncheon, the first paper read was a "Report upon an Investigation on the Chemistry, Botany and Pharmacy of the *Strychnos Nux-Vomica*," by Messrs. Dunstan and Short. This was a *résumé* of work done with the financial assistance of the Conference, which has formed the subject of a series of papers that have already appeared in this Journal. The principal points have been the devising of what the authors claim to be a simple and accurate process for estimation of the alkaloids of nux vomica seeds, in which a mixture of chloroform and alcohol is used for their exhaustion; the application of the process in the examination as to their alkaloidal value of nux vomica seeds from various sources, with the result that of the kinds entering the British market, the Bombay was found to be the richest, followed by Cochin and Madras, whilst all the varieties contained more alkaloid than had been previously supposed; a method for separating

brucine and strychnine, based upon the different solubility of their ferrocyanides; the examination as to alkaloidal strength of galenical preparations of *nux vomica*, leading to suggestions for the standardizing of the tincture and extract which no doubt were the provoking cause for two other papers read at the Conference; the discovery of a new glucoside, which has been named "loganin," in the pulp of the fruit and the seeds; and the examination of some *nux vomica* seeds from Ceylon that proved to be unusually rich in alkaloid.

In some "Notes on the Estimation of Hydrocyanic Acid and Cyanides," Mr. L. Siebold reverted to the subject of a communication read by him last year,—the error to which Liebig's process for the volumetric estimation of hydrocyanic acid is liable if the titration be effected in presence of a deficiency of alkali and the failure of litmus to indicate the point of neutralization. After alluding to weak points in several suggestions that have been made for overcoming this defect, he recommended the use of a standard solution of soda and the performance of a preliminary titration. He also mentioned that in working upon the United States official process, in which an excess of calcined magnesia is used instead of soda, he had found that with certain precautions the carbonates of the alkaline earths might be used, and that, in the presence and by the interventions of silver nitrate, hydrocyanic acid is capable of decomposing such minerals as chalk, calc spar and magnesite.

The next paper, "Further Notes on the Pharmacy of Linseed," by Mr. T. Greenish, gave rise to the most animated discussion of the day. Mr. Greenish is of opinion that serious objections apply to the use of linseed cake as a source of the official *farina lini*, one of them being that it is a by-product and not specially made for the purpose. He would prefer, in its place, linseed rich in farina and as free as possible from weed seed, crushed lightly between iron rollers without expressing any oil, and with about 20 per cent. of the husk removed to make it approximate more closely to a meal. Mr. Greenish stated that when the seed is thus crushed lightly, the oil is hardly disturbed in its natural cells and does not become diffused throughout the meal so as to be exposed over a large surface to atmospheric influences. He also explained the part played by the husk in yielding in contact with water a supply of vegetable mucilage, and said that though the retention of 80 per cent. was equal to the necessities of forming a good plastic poultice, the removal of too large a quantity would leave the farina incapable of doing so. Professor Redwood, whilst admitting the value of the paper, said that when, years ago, crushed linseed came into use it did not answer expectations and was found to turn mouldy when kept in closed vessels. Moreover, he was disposed to believe that under the present system of examination of linseed by the Linseed Association, it must necessarily be very pure and free from admixture of foreign seeds. There seemed to be diversity of opinion as to the explanation of the existing preference for crushed linseed, some speakers attributing it to an actual superiority, and others thinking that it is due to some medical practitioners specially instructing their patients to use it.

The first day's proceedings were brought to a close by the reading of two

papers upon the subject of "Standardizing," one by Mr. G. F. Schacht and the other by Mr. D. B. Dott. That Mr. Schacht does not look with favor upon the proposal to standardize all powerful pharmaceutical preparations is pretty well known. In the present paper he argues that such preparations are divisible into two classes, one consisting of those that are dilutions of definite chemical substances, and so allow of being standardized, and the other of preparations of more or less complex substances, concerning the mode of operation of which little is yet known. In the present empirical state of the practice of medicine, he maintained, it would be worse than useless to pretend to standardize such preparations in respect to their contents in active principle, and he said that even if the case were different it would be for pharmacy to assist in the inquiry, not to initiate or conduct it. Mr. Dott also considers that the attempt to standardize certain preparations would be misleading, and he would see in the alleged variations in their contents rather a reason for their disuse. But he believes that, in nearly every case, if the material operated upon be of proper quality the preparations will be of the right strength. These papers, perhaps on account of the hour, did not give rise to so much discussion as might have been expected, but some disposition was evinced to concur with the writers. Professor Redwood, however, said he saw no reason why preparations of such drugs as opium, cinchona and other drugs containing known active principles should not be standardized as far as possible, leaving what was not yet understood alone.

The proceedings were recommenced on Wednesday by the reading of a note by Mr. Keyworth, entitled "A Fossil Aloe from the Wealden," in which the author had found scope for a flight of the scientific imagination and the executive committee an opportunity for showing the extent of its faith in believing the paper had a bearing on anything pharmaceutical. Mr. Naylor followed with more information respecting hymenodictyonine, the alkaloid from *Hymenodictyon excelsum*, which he has now coaxed to crystallize and represents by the formula  $C_{23}H_{40}N_2$ . It is inferred from the results of experiments that it is a tertiary dyamine closely analogous with nicotine, with which probably it is homologous.

Mr. Willmott's "Note on the Filtration of Lard" was a defence of the position taken by him, in a paper read at the last previous Conference, that the operation of filtering in the preparation of lard is not the most advantageous. His more recent experiments have led him to the conclusion that the operation of filtration is more honored in the breach than the observance, better results having been obtained by straining through flannel, which Professor Redwood is inclined to attribute to the fat not being exposed to atmospheric oxidation so long or over so large an extent of surface. Mr. Naylor said he preferred to melt the flare at a low temperature and filter it as rapidly as possible through paper. In the discussion Professor Redwood incidentally alluded to the vast number of communications that had been received by those engaged on the new Pharmacopœia, some of which recommended the entire exclusion of animal fats; but he said he could not agree with the proposition, as, in his opinion, there is no substance comparable, as a base for ointments, with good, well prepared,



sweet lard, freed at a low temperature as far as possible from extraneous organic matter.

"The Composition of Seidlitz Powders" formed the subject of a paper by Mr. Martindale, who said his attention had been drawn to the subject by the complaint of a customer as to the formation of a foam or scum on the top of the effervescence when some powders supplied by him were dissolved. Upon investigation he found this scum to be due to the formation of cream of tartar when the acid was in excess, and that it more readily occurred when the weather was cold. After referring to the varying receipts current for the preparation of seidlitz powders, he expressed an opinion that an authoritative formula ought to be inserted in the Pharmacopœia, to be followed when powders were supplied upon the prescription of medical men.

The next paper was on "The Pungent Principles of Plants," by Dr. Thresh, which might conveniently have been preceded by one by the same author, read subsequently, on "The Proximate Analysis of *Alpinia Officinarum*." In the latter paper Dr. Thresh described the manner in which he had isolated from galangal rhizome an active pungent principle, which he has named galangol. In the former he dealt with certain points of resemblance between this and other pungent principles, especially gingerol, from ginger, capsaicin, from capsicum, and paradol, from grains of paradise.

A note by Mr. Southall followed, on a specimen of a kind of a gigantic truffle used by the natives of Tasmania as food, which had been presented to the Conference by Mr. Miller. The fungus is referred by Mr. Southall to *Mylitta Australis*, of which he considers it to be the sclerotoid mycelium; it consists principally of pectin.

The last paper read at the Wednesday morning session was a note by Mr. Williams upon some products obtained during the preparation of some specimens of colorless and anhydrous essential oils. The oils were distilled from a fusible metal bath. After all the water, mixed with a little oil, had passed over, the anhydrous oils were collected up to a point when the temperature rose more rapidly and a colored fraction commenced to distil. The distillation was then continued into another receiver until just before decomposition would commence. The colorless anhydrous oil was, as a rule, very much modified in odor, and more delicate than the colored portion, whilst the odor of the residue was strong and sometimes offensive. Mr. Williams appears to think that by this treatment the colorless portions had not only had their aroma improved, but were probably rendered more permanent. Naturally the questions were raised in the discussion whether the foul-smelling portions might not have been products of the process and not educts, and to what extent the odorous constituents might be destroyed or removed with them. It may be worth recalling that an opinion has been expressed by Professor Dragendorff that the odor of an essential oil may be due to a constituent present in extremely minute quantity (*Ph. J.*, [3], vi, 723).

Upon the reassembling of the Conference there were still ten papers on the list unread, not one of the authors of which was present. The principal points in the papers were, therefore, read by the Honorary Secretaries,



Messrs. Benger and Plowman, and as the circumstances were not favorable to much discussion the proceedings were brought to a conclusion about the usual hour. The first was a note on "Tincture of Quinine," by Mr. T. Wright, which contained an account of many interesting experiments as to the causes of precipitates that form in it and the way of avoiding them; the outcome of which was the conclusion that a concentrated neutral tincture of quinine of uniform strength could be best obtained by using the hydrochlorate of the alkaloid instead of the sulphate. In connection with this subject Mr. Martindale expressed a hope that hydrobromate of quinine would be included in the next edition of the Pharmacopœia.

The next two papers were extremely technical. In one Mr. Hodgkin gave his reasons for supposing that "China bicolorata," or "Tecamez bark," is derived, like "cuprea bark," from a species of *Remijia*, which he is inclined to regard as a third species of the genus yielding cinchonine alkaloids and names *Remijia bicolorata*. In the other Mr. Hooper, the recently appointed quinologist to the Government plantations in Madras, gave the results of the analyses of some old cinchona barks, the most notable point in which, perhaps, is that he found in one of them 1.99 per cent. of quinine, being more than had been previously observed in any bark.

Last year Mr. Maben and Mr. Conroy reported to the Conference on the possibility of using sesame oil for pharmaceutical purposes, and expressed opposite opinions as to its availability for the manufacture of lead plaster, the former gentleman stating that it was suitable if a larger proportion of lead oxide were used than is ordered officially. He has since repeated and extended his experiments, and sent with his note describing them some samples confirmatory of his opinions. He obtained very good results when the proportion of lead oxide was increased 40 or 50 per cent.

Another paper by Mr. Maben, in conjunction with Mr. Dechan, was a "Report on the Strength and Condition of Commercial specimens of Hydrargyrum cum Creta, Pilula Hydrargyri and Unguentum Hydrargyri." The statements contained in this communication will no doubt cause it to be studied with considerable interest and it provoked much comment among the members present at the Conference. Twelve specimens of grey powder were found to vary in the amount of unoxidized mercury they contained between 21.2 per cent. and 49.6 per cent.; mercurous oxide ranged between traces and 6.15 per cent.; and mercuric oxide between 0.65 per cent. and 4.67 per cent. Eight samples of blue pill were examined, six of which contained no trace of either oxide; they varied in percentage of mercury from 28.45 to 41.3 per cent. The samples of ung. hydrargyri also varied considerably, only one out of eight containing the B. P. proportion of mercury.

Mr. E. C. C. Stanford has been pursuing his investigations of various bodies reputed to contain iodine and has now added oysters and burnt sponge to the list of those examined. Persons who have hitherto pinned their faith to the special medical efficacy of Anglo-Portuguese oysters being due to the iodine they contain, may perhaps, upon learning that this quantity is only equal to four parts in ten millions, feel they may extend their masticatory operations to other varieties without risking much loss. Turkey sponge turns out to be about four times as rich in iodine as honeycomb sponge.

In a "Note on Sulphurated Lime," Mr. Dymond stated that some comparative experiments had shown that the best method of preparing it is to roast seven parts of finely powdered sulphate of calcium with one of charcoal until the black color has disappeared. In another note he described a method for the estimation of diastase in malt extract.

Mr. MacEwan communicated a "Report on Commercial Peruvian Balsam and the Methods for ascertaining its Purity." Twelve samples from different sources had been examined, and the author stated that so far as he is able to judge the present supply of the balsam is of good quality.

The last paper was a note by Mr. J. R. Hill on the "Presence of Copper in some Pharmaceutical Preparations," which seemed to indicate that the metal in question is frequently present where little suspected. The explanation is, no doubt, to be found in the use of copper vessels for pharmaceutical manipulations.

The concluding business was then proceeded with. Mr. Kay, in the name of the pharmacists of Aberdeen, gave a hearty invitation to the Conference to visit that city next year, and this, on the motion of Mr. Benger, seconded by Mr. Plowman, was accepted. The President then alluded to the loss the Conference was sustaining in the retirement of Mr. Benger and Mr. Ekin, and proposed a hearty vote of thanks to those gentlemen. This, after being supported by Mr. Schacht and Mr. Plowman, was carried by acclamation, and Mr. Benger acknowledged the compliment. The election of officers for the ensuing year then took place, with the following result.

*President.*—J. B. Stephenson, Edinburgh.

*Vice-Presidents.*—F. Baden Benger, F.C.S., Manchester; M. Carteighe, F.I.C., F.C.S., London; C. Ekin, F.C.S., London; J. P. Kay, Aberdeen.

*Treasurer.*—C. Umney, F.I.C., F.C.S., London.

*General Secretaries.*—S. Plowman, F.I.C., M.R.C.S., London; J. C. Thresh, D.Sc., F.C.S., Buxton.

*Other Members of Executive Committee.*—S. R. Atkins, Salisbury; J. A. Bell, Hastings; J. Borland, F.C.S., F.R.M.S., Kilnarnock; J. E. Brunker, M.A., Dublin; W. Hills, F.C.S., London; D. B. Dott, F.R.S.E., Edinburgh; W. A. H. Naylor, F.C.S., London; J. Sim, Aberdeen; W. H. Symons, F.C.S., F.R.M.S., London.

*Local Secretary.*—A. Strachan, Aberdeen.

*Auditors.*—H. J. Joseph, Hastings, and J. Paterson, Aberdeen.

Hearty votes of thanks were then given to the Local Committee, especially mentioning the names of Messrs. Bell, Rossiter, Keyworth, and Joseph, and a similar vote having been enthusiastically given to the President, the business proceedings of the Conference for 1884 terminated.

An hour afterwards a company of about sixty sat down to dinner, at which they were favored with the presence of the Mayor. After dinner the toasts were limited to "The Pharmaceutical Conference," "The Town of Hastings" and "The Local Committee." When these had been responded to, the rest of the evening was devoted to music and conversation.

Provided that the weather be fine an excursion is usually a most agreeable adjunct to the Conference meeting, and this year it was perfection. On Wednesday morning a party of about one hundred ladies and gentlemen

left the Castle Hotel in four-horsed breaks and other vehicles which proceeded along the beautifully wooded road to Battle Abbey. Arrived there, a guide accompanied the party through the different parts of the Abbey and grounds, and his description of the Battle of Hastings was kindly supplemented and to some extent contradicted by a lucid statement from Mr. Thomas Horsham Cole, a local antiquary. Whilst the party was passing through the beautiful library the Duke of Cleveland entered and gave a most courteous welcome. From Battle the company proceeded to Ashburnham, where they were admitted to the rare privilege of seeing the famous artistic, literary and other treasures of that mansion, many of them specially associated with the Stewart kings, and of strolling through the beautiful gardens and grounds. Normanhurst was next visited, but before venturing upon the inspection of the wonderful collection of curiosities accumulated there by Sir Thomas Brassey and his lady, the company lunched together in the tennis court. After lingering about this beautiful spot till the last moment, a rapid drive brought the company back to Hastings, and within half an hour many of them were traveling as fast as steam would allow to all parts of the kingdom.

We cannot conclude our account of this meeting without testifying to the excellence of the arrangements, which reflected the highest credit upon the Local Committee and its energetic Secretary, Mr. Rossiter, as well as upon the General Secretaries of the Conference. Everything went well, with that absence of friction which marks the forethought and care without which the management is apt to come into greater relief. The only drawback to the meeting was the stunted dimensions which it assumed in respect to the personal attendance indispensable to the social phase of the Conference. Perhaps if the Executive will, during the coming year, turn a little of the attention which has been lately somewhat exclusively devoted to increasing the number of members to the multiplication of inducements to bring them together once a year an improvement may be attained in this direction also, *Phar. Jour. and Trans.*, Aug. 16, 1884, p. 123.

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## EDITORIAL DEPARTMENT.

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POISONS IN MEDICINES.—The editorial on page 493 of our last number was written in the early part of August, and on account of the absence of the editor, was not modified after the inquest when under the instruction of Deputy Coroner Ashbridge his jury censured the dispenser Mr. C. W. Mengle who was held to answer the charge of involuntary manslaughter by the Coroner of this county, for causing the death of Ann Carroll, by negligence in omitting to place upon the box containing one hundred strychnine pills of 1-20 of a grain each the label "poison," in accordance with the terms of Act of Assembly of March 31st, 1860, Section 70. The law upon which Mr. Mengle was held is as follows:

"No apothecary, druggist or other person shall sell or dispose of, by retail, any morphia, strychnia, arsenic, prussic acid or corrosive sublimate, except upon the prescription of a physician, or on the personal applica-



tion of some respectable inhabitant of full age, of the town or place in which such sale shall be made, and in all cases of such sale the word poison shall be carefully and legibly marked or placed upon the label, package, bottle or other vessel or thing in which such poison is contained ; and when sold or disposed of, otherwise than under the prescription of a physician, the apothecary, druggist or other person selling or disposing of the same shall note in a register, kept for the purpose, the name and residence of the person to whom such sale was made, the quantity sold, and the date of such sale."

We have been familiar with this law, and many years ago have conversed with some of our most reputed pharmacists upon the interpretation of the words "sell or dispose of by retail," and it has been held by all, that they were used with the view of excluding physicians' prescriptions for medicines. It was reserved for a Deputy Coroner to advance the theory that the latter were included. Fortunately, however, Judge Elcock on September 19th, rendered a decision, directly opposite to that theory, and fully in accord with common sense, with universal usage, with the hitherto unquestioned interpretation of the law and with the evident intention of the law makers. The decision appears to us to be of general importance in regard to the practice of pharmacy, and we therefore give it in full. As to the propriety of reputable physicians prescribing a large quantity of a poisonous drug, it is evidently not limited or questioned by the law, though prudence may often dictate a safer course. Judge Elcock said :

"The deceased, Ann Carroll, being bantered to take some of the pills contained in the box, took fourteen of them at once, and several other persons took from eight to fifteen of them each. The pills were sold by the relator, who was in the employ of George I. McKelway, a druggist, by the order or prescription of Dr. Walter F. Atlee, and were labelled, as is usual, with the druggist's label and the directions—'Use one at meals, as directed by Dr. Atlee.'

"Involuntary manslaughter is when it plainly appears that neither death nor any great bodily harm was intended, but death is accidentally caused by some unlawful act not amounting to felony, or an act not strictly unlawful in itself, but done in an unlawful manner and without due caution. If, therefore, the duty rested upon the relator to label this box 'poison,' the failure to do so would be such negligence as would render him liable to the prosecution started. The question therefore is, Is it the duty of a druggist who sells a poison by direction of a physician to affix thereon the label aforesaid? A construction must be given to the act which must be in accordance with the intention of the framers of the law. By the report of the Commissioners of the Penal Code, it is stated that 'it was enacted to prevent mistakes in the sale of noxious drugs; to throw impediments in the way of malicious and wicked persons obtaining them for murderous purposes, and to facilitate the detection of such persons when their malignant purpose has been accomplished.' There is nothing, therefore, in the intention of the framers of the act to enact any law which would restrict or narrow the sale of the drugs for legitimate purposes or where directed to be used by the accustomed mode of legal practice known at the time. Two modes of sale are provided for, one by the prescription of a physician, and the other on the personal application of a respectable inhabitant of the place. The prescription furnishes all the information required by the law, and all that is given when the same is made on the personal application of the inhabitant. It is argued that the plain reading of the act would compel any one selling the drugs named to mark them as poison. If this were so it might also be argued that any compound containing poison should also be so marked, and thus any sale of a poison in the most infinitesimal quantity require the same labelling. A homœopathic



physician might be compelled to label his remedy in like manner. No good purpose would be served by such a construction.

"It is clear from a reading of the section, which is not artistically drawn, that it should be divided into sentences, and that the first sentence should end with the word 'physician,' where first named, and that the words 'such sales,' as they afterwards occur in the section, refer to sales made to others than those on the prescription of a physician. By this division of the section the reading of it will be in accordance with the end sought to be accomplished by the Legislature. The Legislature could never have intended that a prescription of a reputable physician in a case of delicate treatment in which one of the poisons named should be used in a proper quantity, should be sent by a druggist to the sick room of a nervous patient with the word 'poison' marked upon the label. Medical treatment would be ended, and the power placed in the hands of the druggists to destroy the benefit of the physician's remedy. Such a law would be destructive of medical science, unreasonable and against the spirit of sound legislation.

"The direction placed upon the box, 'use one at meals as directed by Dr. Atlee,' showed plainly the nature and power of the dose, and that it was not an article of food. If the unfortunate people who, in a rash banter, ate this box of pills, had been gifted with the smallest amount of prudence or ordinary caution in observing the directions upon the label, they would not have been the subjects of sickness and death as has resulted. I see not wherein the relator has been guilty of any breach of the law, and he should go hence freed and discharged of all liability. Relator discharged."

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**READY-MADE MEDICINES.**—The article with the quaint heading, from the pen of Mr. J. Winchell Forbes, which we publish in another place, contains so much that points directly to the causes underlying the evils from which pharmacy suffers at present, that we believe it will be read with a great deal of interest, even though not *all* the views advanced by its author be accepted. We do not propose to comment upon the article itself, but merely refer to that sentence in which Mr Forbes characterizes the manufacture on a large scale of a certain class of medicines as a direct blow at the advancement of pharmacy. We would subscribe to this proposition, as we do to many other points advanced, if it had been stated upon the broader ground, that the pharmacist should himself prepare as many as possible of the various medicines which are used in physicians' prescriptions, as well as in the ordinary retail sales. Is he less responsible who dispenses the extracts, fluid extracts, elixirs, plasters, lozenges, suppositories and other classes of preparations from the manufacturers, than he who sells a sealed package of a drug or compound made by another? We fail to see any essential difference between the one and the other except possibly in degree; perhaps the one occupies the plane of the vendor of sugar and coffee, the other that of the vendor of canned fruits.

Division of labor has made so many inroads upon pharmacy that much of what was formerly his peculiar province, has been wrested from the pharmacist's laboratory; the manufacture of morphine, quinine and most other chemicals, which are largely used, will not again be undertaken by him. Does the case hold also good for the pharmaceuticals? We believe not. They belong to the pharmacist's peculiar sphere, and if he permits these to be supplied to him by others, he voluntarily places himself on a level with a common dealer, or approaches that position. The question

whether the pharmaceuticals purchased are equal in quality or not to those made by himself, has *à priori* nothing to do with the ultimate result. From personal acquaintance with a number of manufacturers and their products, we know that the material used and the products turned out by them, are as good as can be had from the better class of apothecaries. Moreover, we regard them, as merchants, to be perfectly justified in supplying an existing demand, or if possible creating a demand for their products; but in our opinion the true pharmacist is not, habitually, a purchaser of ready-made medicines.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

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*Quarantine and Sanitary Operations of the Board of Health of the State of Louisiana during 1880, 1881, 1882 and 1883.* By Joseph Jones, M.D., President of the Board of Health. Baton Rouge: 1884. Svo, pp. 393.

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*Poisoning by Canned Goods.* By John G. Johnson, M.D. Reprint from the Medico-Legal Journal.

This paper advocates the abandonment of the chlorides of zinc and tin in soldering canned foods, as being very detrimental to health. Sufficient chemical evidence is not furnished; for the latter, see paper by Professor Attfield, in Amer. Jour. Phar., 1884, p. 269.

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*Poisoning by Cannabis Indica.* By A. B. Cook, A.M., M.D.

This reprint from the American Practitioner for July, 1884, gives the history of a case of accidental poisoning and recovery after taking two drachms of Herring's extract of cannabis.

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*Sur la recherche de l'Albuminose ou Peptone dans l'Urine.* Par le Dr. C. Méhu.

On the recognition of albuminose or peptone in urine. Reprint from Annales des Maladies des organes génito-urinaires, May, 1884.

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*Catalogue général des livres anciens et modernes, français et étrangers de médecine, de chirurgie, de pharmacie, de l'art vétérinaire et des sciences qui s'y rapportent.* Paris: B. Ballière & Fils, 1884. Svo, pp. 448. Price 2 francs.

Catalogue of old and new French and foreign works on medicine, surgery, pharmacy, etc.

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*Einige practische Ergebnisse meiner Untersuchungen über das Chlorophyll der Pflanzen.* Von Dr. A. Tschirch in Berlin. Halle a. S., 1884. Svo, pp. 20.

Some practical results of my investigations on chlorophyll.

This pamphlet was published in commemoration of the fifth anniversary of the Academical Pharmacognostic Society in Berlin, July 7, 1884.

*Proceedings of the New Hampshire Pharmaceutical Association*, at the Tenth Annual Meeting, held in the city of Concord, Oct. 9, 1883. 8vo, pp. 54.

The next meeting will be held at Lancaster, N. H.

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*Die kosmischen Consequenzen der Spectral Analyse.* Von Prof. Dr. Albert Ladenburg.

The cosmical consequences of spectrum analysis. A discourse delivered by Prof. Ladenburg, March 5, 1884, on entering upon the rectorate of the Royal Christian-Albrecht-University of Kiel.

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The following essays from the University of Dorpat have been received :  
*Die Alkaloide des Aconitum Lycoctonum.* Von G. Dragendorff und H. Spohn. 8vo, pp. 44.

The alkaloids of *Aconitum Lycoctonum*. Reprint from the *Phar. Zeitschrift für Russland*, 1884.

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*Beiträge zur Kenntniss der Alkaloide des Aconitum Lycoctonum. I. Lycacotin.* Von Gotthard Jacobowsky. Pp. 48.

Contributions to our knowledge of the alkaloids of *Aconitum Lycoctonum*. I. *Lycacotinine*.

*Beiträge zur forensischen Chemie des Sanguinarins und Chelidonins.* Von Arwed von Kügelgen. Pp. 33.

Contributions to the forensic chemistry of sanguinarine and chelidonine.

*Beiträge zur forensischen Chemie der wichtigeren Berberideenalkaloide.* Von L. von Hirschhausen. Pp. 30.

Contributions to the forensic chemistry of the more important alkaloids of the *Berberidaceæ*.

*Beiträge zur Kenntniss der Chinidin- (Conchinin-) Resorption, nebst Berücksichtigung seines forensisch-chemischen Nachweises.* Von Alex. Hartge. Pp. 54.

Contributions to our knowledge of the resorption of quinidine (conquinine); also with regard to its forensic chemical detection.

*Beiträge zum gerichtlich-chemischen Nachweise des Cinchonidin.* Von Peter Thielick. Pp. 27.

Contributions to the forensic chemical detection of cinchonidine.

*Über das Schicksal des Caffeins und Theobromins im Thierkörper nebst Untersuchungen über den Nachweis des Morphins im Harn.* Von Richard Schneider. Pp. 66.

On the change of caffeine and theobromine in the animal body; also researches on the detection of morphine in urine.

*Ein Beitrag zur Kenntniss der Kinogerbssäure.* Von Alex. Bergholz. Pp. 42.

*Forensisch-chemische Untersuchungen über das Colocynthin und Elaterin.* Von Ernst Johannson. Pp. 35.

Forensic chemical researches on colocynthin and elaterin.

*Chemische Untersuchungen der rothen Manaca.* Von R. Lenardson. Pp. 37.

Chemical investigations of red manaca.

# THE AMERICAN JOURNAL OF PHARMACY.

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NOVEMBER, 1884.

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## PHARMACEUTICAL STILLS AND VAPOR CONDENSER.

BY L. WOLFF, M. D.

*Read at the Pharmaceutical Meeting, October 21.*

One of the most desirable features essential to the further advancement of pharmacy is that every pharmacist should at least make the most, if not all, of his galenical preparations and many of his chemicals. Why this is now so seldom done seems to depend upon the respective cost of production at our own laboratories and that of purchase from the various manufacturers. That the manufacturer by large purchases obtains a material reduction in the price of the raw material there is no doubt, but that the difference in price between a few pounds and a bale or barrel is not near that of the relative cost of production and purchase is also certain.

That the wholesale manufacturer's expenses are more than the pharmacist's, in proportion to the quantity produced, even admitting that the same care is exercised, and an equally reliable article made by them, is also without question. The liberal advertising done by the former to create a market for his goods, and the skilled labor employed by him, must all be paid from the margin on his wares, as it is obvious that no matter how large the quantity is, goods cannot be sold below the cost of production without loss, or below a certain limit if a standard of quality is to be observed.

The supply for crude drugs in limited quantities is facilitated, at the present day, to such an extent, that there is little excuse for any pharmacist to buy his fluid or solid extracts, providing that he has the necessary apparatus for recovering the menstruum or solvent employed. With proper means for doing so, no more than 10 per cent. of alcohol ought to be lost in their manufacture, and with that loss alone we cannot understand why a pharmacist should not more than compete with the wholesale manufacturer.

Take fluid extract of ergot, for instance, and employ the very best



Spanish ergot, at a cost of about 35 cents per pound (which is probably not always done by wholesale manufacturers), and grind it in an ordinary drug-mill, which is, or ought to be, in every drug store. The grinding, done at leisure hours by the available help, without extra expense, as well as passing through a suitable sieve, offers an advantage over the manufacturer. The menstruum of the reserve liquid, amounting to 85 per cent. of the final result, and consisting of 3 parts of alcohol and 4 of water, would cost only about 14 cents, and the evaporated remainder contain no alcohol. If the residual ergot of the percolator is mixed with water and expressed, and the alcohol in the expressed liquid recovered by distillation, the loss of alcohol would certainly be very small, and not amount to more than 10 cents per pound at the utmost. If the amount for ergot be set down at 35 cents, alcohol in extract at 14, loss at 10, and gas or oil for heating at 10, the cost of a reliable article can be computed at 69 cents per pound. What my *confrères* pay for it in the market I need not state here.

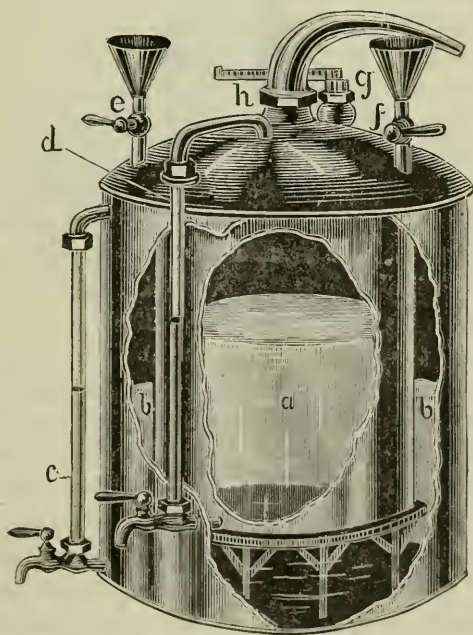
That the precipitated, purified aqueous extract of ergot, usually sold under the name of ergotin, can be made by every pharmacist, with recovery of the alcohol employed, at less than one-half of the lowest wholesale price now asked, I could demonstrate equally as well. Most, if not all, of the alcoholic and semi-alcoholic extracts can be prepared even in small quantities in the pharmaceutical laboratory with equal advantage and economy, as well as the new abstracts of the Pharmacopœia. The great desideratum which has always presented itself to me in the work of the laboratory has been that of a proper distilling apparatus.

The recovery of volatile solvents is an easy matter in laboratories with steam supply and properly jacketed stills and evaporating pans; but, without these, the alternative remains either to distil over the open fire, and thereby endanger the product, or, by placing a small still in hot or boiling water, conduct the process in a tedious and imperfect manner.

To overcome this defect and at once to have a distilling apparatus of suitable productiveness, which admits of distillation with or without pressure, I had constructed, of tinned copper and medium weight, the apparatus I here exhibit, which was made after a design executed by one of my assistants, Mr. J. Robert Moechel.

It will be seen by the cut, showing both the interior and exterior, that it is of cylindrical shape, about two feet in height, that it consists

of two cylinders, one inside of the other, and that both are attached to the convex top; the inner cylinder is mounted on a rest to prevent its weight from dragging down the common top. This inner cylinder contains the menstruum, *a*, to be distilled, or the alcohol to be recovered, which can be introduced at any time through the funnel, *f*. Attached to it from the top and reaching to its bottom is the gauge, *d*, through which the height of its contents, *a*, is seen. At the bottom of the gauge and connected with it is a faucet to draw the contents off at any time. The outer cylinder, which serves both as a joint steam and water-bath, contains water, *b*, connected with the water-gauge, *c*, which indicates the volume contained in it; a faucet attached to the lower end of it serves to draw off the



water as needed. Attached to the top of the outer cylinder is a steam valve, *g*, by which, if lifted, the steam may escape without pressure, or, if weighted, may be made to assume any desired pressure. The inner cylinder connects at *h*, by a screw-joint and gum packing, with a bent pipe, which in turn can be attached to a large copper Liebig's condenser, such as I here exhibit, or, instead, to one of Prof. Remington's condensers, if so desired.

This apparatus is especially useful for recovering the alcohol from dilute menstrua and for concentrating alcohol largely diluted for purification, as well as for operating with solvents of larger volume, as in the manufacture of resin of podophyllum, berberine and hydrastine, apiol, etc. The solvent in these processes contained in the inner cylinder, and consisting of about five gallons of stronger alcohol, can be recovered in sufficient time to continue percolation with it, making the process almost continuous, and admitting of a twenty- or thirty-gallon exhaust to be effected with only about five gallons of menstruum above that absorbed by the substance to be exhausted.

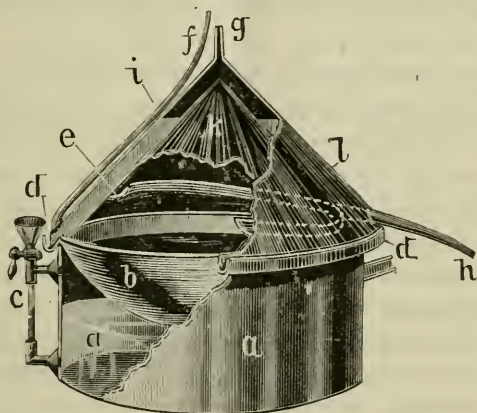
One of the disadvantages of this apparatus is the difficulty of cleansing it after concentrating the liquid to be distilled to a certain degree, and therefore the impossibility of conducting the evaporation to the degree desired. The heating necessary to drive over the vapors, which can only be accomplished at the boiling point of the solvent, is in many cases, especially in aromatic extracts and those containing volatile oils or principles, a great disadvantage; while, if the evaporation is completed in some other flat vessel, considerable loss of the solvent is experienced—which, if alcohol, ether, chloroform, or carbon bisulphide are employed—interferes greatly with the cost of the product.

The most suitable apparatus for recovering all the solvent, and one admitting of rapid evaporation without loss to dryness of a solid, or the desired density of the residual evaporate of a fluid extract, is undoubtedly the “Hood Vapor Condenser,” which has been in use for some time. It has several claimants for the credit of its origin, but I have not been able satisfactorily to attribute it to any one of them. It is one of the most useful, if not the most useful, solvent reclaimer of any in use in the pharmaceutical laboratory. Its principle of projecting hot vapor against a cooled slanting surface, from which the condensed liquid is recovered by a gully, is certainly not new, but its application offers advantages even beyond that principle. The vapor condensing in the hood over the evaporating dish, on being condensed, presents a vacuum which greatly facilitates evaporation, and lowers the boiling point of the liquid in it. I had for some time employed the hood condenser, simply fitted loosely on the evaporating dish, and with most excellent results in its operation, but found that with energetic ebullition the vapors would be forced out between dish and hood, occasioning, when ether, benzin, and carbon bisulphide were employed,



dangerous explosions; while in the evaporation of alcohol and chloroform the loss sustained was considerable. This caused me to adjust it in a manner which I will demonstrate in the apparatus here exhibited.

To a water-bath, *a*, containing water, *cl*, fitted with a water-gauge, *c*, and faucet to admit turning off to keep the steam, or by turning on to let steam escape, or to add water as needed, and having proper handles to facilitate its removal, is fitted a tinned copper evaporating dish, *b*, as tightly as possible to prevent the escape of steam at the



sides. The evaporating dish has on its sides a groove, *d*, as a receptacle for a flange from the outside cone of the condensing hood. The hood itself is, like the rest of the apparatus, made of light weight tinned copper, and consists of two cones placed parallel within each other, about one inch apart. The two cones are closed squarely at the bottom, the outer, *l*, projecting and dipping down to form the flange for the water-joint to fit into the groove heretoforementioned. Running from the top on the outside of the outer cone is a supply pipe, *f*, for cold water, which enters into the space between the two at the bottom of the outside ones. From the top of the outer cone extends a pipe of the same diameter as the former to admit the escape of the water at *g*. The water for cooling is conducted to *f* by a rubber tube from a hydrant or reservoir, and allowed to flow off by a tube again into a sink or receptacle, or, as I have often done when sufficiently cool, into another similar apparatus for further condensing purposes. When in operation the vapors arising from the evaporating dish will be condensed on the



inner surface of the cone, *k*, and by its slant will run into the gully, *e*, which is in turn placed slanting into the cone to allow the flowing off of the condensed liquid through the tube *h*. The water-joint, *d*, may be filled with water, but better, according to the solvent to be recovered, with oil or glycerin, and it makes the closure absolute and air-tight, without either the danger of escaping vapor and loss, or of explosion. The hood can easily be lifted to inspect the contents of the dish, or to replenish the same if necessary, doing away with the screws, flanges, and packing usually employed. To admit of proper operation of the water-joint, however, care must be had to make the escape-pipe, *h*, of the proper diameter, and give it sufficient dip to cause the condensed liquid to flow off readily, for with a small tube, as I had at first, and horizontally placed, I soon found that the filling of the pipe with liquid and the condensing of the vapor in the hood caused a vacuum which rapidly sucked up the liquid from the water-joint. Care must also be observed that the apparatus should be perfectly level; the liquid in the water-joint will give the best indication for that purpose.

An apparatus such as I have exhibited will answer all the purposes pointed out, both as an evaporator and a still. The heat necessary for its operation may be had either from a gas stove, or, where gas is not at hand, and even with greater economy, by a coal-oil stove, or may readily be operated by placing it on the top of an ordinary kitchen range or stove. There is absolutely no danger from explosion, and the recovered liquid, if highly inflammable, may be led away by a proper tube from any dangerous proximity of the flames. The fact that the evaporating dish is made of copper will not interfere with the evaporation of acid liquids, as these can be placed in porcelain dishes inside of it without interfering with the results.

The advantages of this apparatus are its simplicity and small expense, the rapidity with which evaporation is effected by it, its adaptability to any scale, the fact that in it evaporation may be conducted to the very end, and the ease with which residua may be removed and the apparatus itself be cleaned. Its work as a still is fully equal and greater than an ordinary one of its size, while it is perhaps the only apparatus by which vapor can be condensed at a comparatively low temperature and without boiling of the contents. For the manufacture of the fluid and solid extracts, oleoresins, abstracts, etc., on a small scale, I certainly know of no more suitable apparatus and one more adapted to the wants of the pharmacist. It might still further be improved

by the addition of a suitable thermometer, inserted through a cork in a proper opening in the hood, but I think for ordinary purposes it would be superfluous.

I offer the description of the above distilling apparatus, not with any special claim for originality or novelty, but simply as adaptations to the needs of the pharmaceutical laboratory; as such I have found them of great practical value, and if their employment aid to the desirable end of placing the pharmacist in his proper domain as a producer rather than a small dealer, the object of this paper will be fully attained.

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## THE ROOT OF PHYTOLACCA DECANDRA, LINNÉ.

BY EDMOND PRESTON, JR., PH.G.

*From an Inaugural Essay.*

No plant among us is more conspicuous in the fall than the poke for its large clusters of annual purple stems, covered at the top with ovate-oblong leaves, and bearing large pedunculated racemes of fine purple colored berries. A peculiar phenomenon was noted while observing *Phytolacca* at night in the fall, the leaves presenting a phosphorescent appearance in the dark. This peculiarity not being mentioned in any of the Dispensatories, a further search was made for a record of such a phenomenon in connection with this plant, and the following was found in Gmelin's Chemistry, vol. i, p. 188:

"Some plants emit in the dark a faint, continuous light, probably resulting from the formation of some substance which burns and emits light at ordinary temperatures, and consists, not of phosphorus, but more probably of a compound containing carbon and hydrogen. The leaves of *Phytolacca decandra* have been observed to shine in September from 9 till 12 o'clock at night, sometimes with blueish-green, sometimes with yellowish-green light, accordingly as the current of air was stronger or weaker; they also remained luminous after being wiped."

The large perennial root, in some specimens from 8 to 10 inches in diameter, has an expanded crown where the numerous stems are joined. This thick part of the root grows perpendicularly to the depth of 12 to 18 inches, where it divides into from two to four nearly equal branches, which extend horizontally, in different directions, from 6

to 10 feet, from the main root, and gradually taper in size. These main branches seldom divide again, but irregularly send off smaller ones.

*Estimation of Moisture.*—100 gm. of the fresh root, sliced in thin pieces, was allowed to dry in the air to the condition as it is found in commerce, losing thereby 72.84 gm. On continued exposure in a drying chamber until it ceased to lose weight a loss of 7.889 gm. was noted, showing a total of 80.729 per cent. of moisture and 29.046 per cent. in the air-dried or commercial root.

*Ash.*—10 gm. of the powdered (air-dry ?) root yielded an ash weighing .84 gm., equal to 8.4 per cent. Of this ash .68 gm. was soluble in water, .16 gm. insoluble. Potassium was found to be the principal base in the soluble portion; by precipitating it with saturated solution of bitartrate of sodium; it equals nearly 5.5 per cent. KOH of the powdered root. The large amount of potassium salts found in this drug is noticeable. A little sulphuric and hydrochloric acid, besides carbonate, was found in this portion. The ash insoluble in water yielded to hydrochloric acid a little calcium and iron, and left silica behind.

In the following experiments the fresh root was used. The experiments of Donnelly ("*Am. Jour. Phar.*," Oct., 1843, p. 165) and W. F. Pape (*Ibid.*, Dec., 1881, p. 597) were verified in so far as to the finding of starch, tannin, gum, sugar, resin, fixed oil and lignin. In view of the rapid deterioration of *Phytolacca* root on keeping, and the probability of its containing an alkaloid, as pointed out by W. F. Pape, the first experiments made were in search of a volatile alkaloid.

A strong tincture of the root, prepared with diluted alcohol, and made alkaline with solution of potassa, was distilled in a glass retort, and the distillate, having a strong, disagreeable odor of the root, was caught in distilled water slightly acidulated with sulphuric acid. After concentration, the tests for alkaloids were applied, with negative results.

A portion of the root was finely broken up and macerated in cold water for 24 hours, then the whole introduced into a retort and distilled in a salt water bath. The distillate had the characteristic odor and acrid taste of the root, and a strong acid reaction. The acid distillate was set aside and the contents of the retort divided into three portions. With the first distillation was continued as before, but no change took place in the distillate. The second and third portions



were distilled separately after the addition of solution of potassa and sulphuric acid to each respectively, and still no change could be noted in the distillate.

The first acid distillate was then carefully neutralized with solution of potassa. A change of color was here noted as the liquid neared neutrality, the colorless liquid changing to a pale light yellowish-green, and at the same time the odor almost entirely disappeared. The solution was slowly and carefully evaporated to a small bulk, and, on allowing to stand, a small crop of nearly colorless acicular crystals separated. These had an acrid taste, resembling that of the root, after remaining in the mouth a short time. On being treated with acids the salt was decomposed, the acid going off with effervescence, and giving the characteristic strong disagreeable odor of the root in an intensified degree. The crystals I consider to be the potassium salt of a volatile acid characteristic of *Phytolacca* root.

A strong decoction of the root was precipitated with solution of subacetate of lead, filtered, and the lead precipitated from the filtrate by a current of hydrosulphuric acid gas; again filtered, and a portion evaporated to a small bulk. This was divided into four parts, and tested for alkaloids with phosphomolybdic acid, tannin, iodohydrargyrate of potassium and auric chloride; each gave a precipitate indicating the presence of an alkaloid, to separate which the following method was used:

The filtrate from the lead precipitate was carefully concentrated and mixed with an equal volume of saturated alum solution. The mixture was heated, ammonia added in slight excess, the whole evaporated on a water-bath, and the residue powdered and extracted with alcohol. On evaporating the alcoholic liquid a yellowish mass of small crystals was obtained. This was redissolved in alcohol, the solution passed through animal charcoal and carefully evaporated, when small, nearly white crystals were left. These were quite soluble in alcohol, moderately so in water and nearly insoluble in ether and chloroform. They were entirely dissipated when heated upon platinum foil, and in aqueous solution gave precipitates with the four alkaloidal reagents before mentioned. With strong nitric, sulphuric or hydrochloric acids the crystals simply dissolved, giving no characteristic color test.

The alcoholic solution of the crystals, neutralized with diluted hydrochloric acid, on concentration yielded nearly colorless acicular



crystals, which were moderately soluble in alcohol, quite soluble in water, and possessed a strong acrid taste.

From these results I conclude that the crystals were those of an alkaloid contained in *Phytolacca* root and of the hydrochlorate of the same, for which I propose the name of *Phytolaccine*.

## LABORATORY NOTES.

### ABSTRACTS FROM THESES.

*Cantharides*.—Emlen Martin determined the amount of cantharidin obtainable from commercial cantharides and powdered cantharides by the method of Procter and Mortreux (chloroform and carbon bisulphide). One specimen in which the soft parts had been destroyed by mites yielded no cantharidin; a second specimen probably old, left an uncrystallized wax-like substance not further examined; a third specimen attacked by mites, gave .38 per cent. of cantharidin. Five specimens of the powder yielded respectively .25, .30, .48, .49 and 1.06 per cent. of cantharidin; the sample yielding the largest amount, being destitute of green lustrous particles, was most likely made from Chinese blistering beetles.

*Distilled Water of Wild Cherry Leaves*.—George E. Spangler collected the leaves of *Prunus serotina* in the latter part of June, 1883. After macerating  $12\frac{1}{2}$  troyounces of the well bruised leaves with  $4\frac{1}{2}$  pints of water, 18 fluidounces were distilled over, the distillate containing hydrocyanic acid. The leaves collected in July yielded a stronger distillate. It is thought that if the quantity of distillate was made equal in weight to the leaves, the strength of the water would amount to 0.1 per-cent. HCy.

*Spigelia*.—William C. Boynton, on examining true pinkroot obtained the following results: Moisture 8.621, benzol extract (resin, wax and fat) .518, alcohol extract (resin, tannin, extractive) 7.418, and water extract (gum, tannin, extractive) 11.008 per cent.; with diluted alcohol 18.64 per cent. of extract were obtained.

*Phlox Carolina* contained 9.5 per cent. of moisture and yielded with diluted alcohol 17.57 per cent. of extract. The ash is stated to have amounted to 18.8 per cent., and for spigelia to 20.5 per cent.; a quantitative determination of its constituents was not made.

*Stigmata Maydis* have been examined by John M. Hillan. He found fresh corn silk to contain 83·3 per cent. of moisture, and the well dried drug to reabsorb water from the atmosphere quite readily. Dry corn silk yielded 12·5 per cent. of ash containing carbonates, chlorides, phosphates and sulphates of potassium, magnesium and calcium, alumina and silica. Benzol extracted 2 per cent., the extract having a brown color and containing fixed oil and resin. Alcohol of 80 per cent. yielded 26·05 per cent. of extract, containing tannin and chlorophyll, and water subsequently dissolved 2·25 per cent. of extractive. Sugar was found in green, but not in dried corn silk. Distillation with water did not yield a volatile oil; on distilling with potassa, an alkaline liquid was obtained, which on being evaporated with acetic acid yielded crystals, and the solution of which was precipitated by iodine and by Mayer's solution.

*Fluid Extract of Corn Silk.*—J. M. Hillan prepared a fluid extract by M. Kennedy's formula ("Amer. Jour. Phar.," 1883, p. 243), and found it to occasion a precipitate. Made from the dried corn silk by the same process, the preparation was permanent; but the author recommends to increase the glycerin, using for 100 Gm. of dry corn silk 25 Gm. of glycerin and sufficient diluted alcohol to obtain 100 Cem. of fluid extract.

C. H. Oberholtzer observed that the fluid extract prepared by Mr. Kennedy's formula would ferment (?) and recommends as a menstruum a mixture composed of two parts of alcohol and three parts of water, using 100 Gm. of green corn silk for obtaining 100 Cem. of fluid extract.

*Syrup of Corn Silk.*—J. M. Hillan recommends dissipating the alcohol by mixing 12 parts of the fluid extract with 65 parts of sugar, and after the alcohol has evaporated, adding 5 parts of glycerin and sufficient water to make 100 parts.

C. H. Oberholtzer recommends mixing 35 parts of his fluid extract with 65 parts of simple syrup.

*Syrupus Myrrhæ.*—Abraham L. Ballinger examined several specimens of myrrh and powdered myrrh, and offers the following formula for a syrup:

Take of Tincture of myrrh.....	℥ij
Magnesium carbonate.....	℥i
Sugar.....	℥xij
Water.....	sufficient.

Rub the tincture with the magnesium carbonate, afterward with

8 ounces of water, filter and dissolve in the filtrate the sugar. The syrup should measure 16 fluidounces. It has an agreeable flavor, makes a good vehicle for administering nauseous medicines, and can be made to take the place of syrup of tolu.

*Phosphoric Acid*.—Harry Lovett Miller, Jr., examined four samples of commercial phosphoric acid and found these to respond to the pharmacopœial tests for purity, except that two samples contained slight traces of phosphorous acid, and one sample was contaminated with arsenic, which, estimated as  $Mg_2As_2O_7$  was found to be .031 per cent.  $As_2O_3$ . The specific gravities ranged between 1.229 and 1.347, and on evaporating 5 Gm. of the acid with 10 Gm.  $PbO$  and igniting, the residues weighed respectively 11.29, 11.57, 11.60 and 11.66 Gm.; the Pharmacopœia requires 11.81 Gm.

*Magnesium Carbonate*.—Frank Gibbs Ryan has assayed six samples of this salt prepared by different manufacturers. On boiling with 20 times their weight of water, filtering and evaporating, residues were left weighing .18, .26, .28, .40, .44 and 48 per cent. Magnesium oxide was estimated merely by ignition, carbon dioxide by hydrochloric acid in a Geissler's apparatus, and water by the difference. The results compared with the theoretical amounts according to the formula recognized by the United States Pharmacopœia are as follows:

	U. S. P.	Samples	1	2	3	4	5	6
MgO	41.32		41.85	44.65	43.25	43.45	41.00	41.30
CO <sub>2</sub>	36.36		34.90	34.05	33.75	32.45	31.85	31.80
H <sub>2</sub> O	22.32		23.25	21.30	23.00	24.10	27.15	26.90

*Granulated Magnesium Citrate*.—James A. Pool examined three commercial specimens, and determined the percentage of

Magnesium carbonate,	3.9	1.0	3.2
SO <sub>3</sub> .	4.3	1.0	0.7
CO <sub>2</sub>	12.5	7.5	10.5

In addition to these, sodium, potassium and citric acid was found, and neutral solutions of each specimen on being boiled with silver nitrate, yielded a metallic mirror, which was regarded as evidence for the presence of tartaric acid.

*Blaud's Pills*.—John A. Murtaugh obtains a satisfactory pill mass by using exsiccated ferrous sulphate, and well-dried potassium carbonate, forming the mass with powdered liquorice root and honey (See "Amer. Jour. Phar." 1883, p, 141). But compression is preferred,  $\frac{1}{4}$  grain of acacia

or of sugar being added for each pill to the mixture of dried salts, to render the powder sufficiently adhesive. As a still better method for preserving these pills it is suggested to introduce into the mould about  $\frac{1}{2}$  grain of powdered sugar, then the pill, cover with  $\frac{1}{2}$  grain of sugar and compress.

## GLEANINGS FROM SCANDINAVIAN JOURNALS.

BY HANS M. WILDER.

The *poison law in Denmark*, as far, as it relates to morphine and opium, has been (July 20, 1883) remodeled as follows:

1. Prescriptions (whether for external or internal use) containing morphine, its salts or any other alkaloid of opium, *must not be repeated*, and it is made obligatory to cancel the prescription with a stamp, covering (but not making illegible) the writing.

2. Prescriptions (whether for external or internal use) containing opium and its (officinal or unofficinal) preparations *must not be repeated* when the single dose amounts to 5 centigrams or over of opium, or when the total amount prescribed amounts to more than 1 gram. These, also, must be cancelled as above stated.

3. Whenever a prescription ought to be cancelled and repetition prevented, because the total amount is more than 1 gram opium, it is *not allowed* to give a fractional part (half, quarter, etc.), so as to enable the repetition of said prescription.—*Arch. for Pharm.*, 1884, p. 94.

A Swedish apothecary bought a seroon of *Calisaya cinchona* from Jobst, in Stuttgart, which was quoted in his price-current as “*aller-schönst, electissima*,” and at a considerably higher price. No quinine was found in the bark, and, on remonstrating, Jobst stated that for the last ten years flat *calisaya* contained very little quinine, scarcely one-third of the  $2\frac{1}{2}$  per cent. *cinchona* alkaloids generally present.—*Farm. Tidskrift*, 1883, p. 321.

*Filix mas*.—The rhizome of *Polystichum Filix mas*, *Roth*, has been found contaminated with admixture of the rhizomes of *Asplenium Filix femina*, *Bernh.*, *Polystichum spindulosum*, *D. C.*, and *Polystichum dilatatum*, *Hoffm.*—*Farm. Tidskrift*, 1883, p. 129.

*Kamala*.—Liljenström has found the following per cent. of ash: 4, 10, 17, 33, 35, 40, 45, 49. Two samples of LUPULIN were found



to have, respectively, 24 and 26 per cent. of ash.—*Farm. Tidskrift*, 1883, p. 151.

A letter from a Swedish pharmacist in the United States concludes with the advice that “drunkards had better stay at home.”

A correspondent of “*Farmaceutisk Tidskrift*,” 1883, p. 348 (Sweden), complains of a custom, not entirely unknown here in the United States, of physicians prescribing unofficinal galenical preparations (mixtures, etc.) by the name of the originator; such a prescription cannot be understood by every pharmacist. The preparation in question was liquor (solutio) *aluminæ acetatis*, which—originating with Burow—is often prescribed as “*Solutio Burowi*.”

*Test for Free Mineral Acids in Vinegar and Wines*.—J. G. Bergman takes advantage of the fact that oxalate of calcium is insoluble in acetic and tartaric acids, but soluble in mineral acids. Take 5 cc. of the liquid to be examined, and 5 drops test-solution of oxalate of ammonium, and then 10 drops test-solution of sulphate of calcium. (The addition of the lime solution is not necessary with wines, which generally contain sufficient lime.) In the absence of free mineral acids, a precipitate of oxalate of calcium will occur (either at once or after awhile); if, however, mineral acids be present, the liquid will remain clear. After repeated experiments it was found that as little as one-half of 1 per cent. of free sulphuric, nitric and muriatic acids could be detected.—*Farm. Tidskrift*, 1883, p. 251.

*Absorbent Cotton*.—E. Poulsson modifies Slocum's process (see “*Am. Jour. Phar.*,” 1881, p. 53) as follows: 1 kilogram cotton is boiled for half an hour in 4 litres water, containing 25 grams caustic potassa, and then well washed till every trace of alkali has been removed. It is squeezed quite dry and put for 15 to 20 minutes in a 5 per cent. solution of chlorinated lime. After washing with a little water (not too much) the cotton is dipped into water acidulated with muriatic acid (about 30 grams diluted muriatic acid to 4 liters water), rinsed in fresh water, and boiled again in alkaline water of the above mentioned strength. After washing, it is dipped into the acid solution and rinsed perfectly. Let dry.—*Farm. Tidskrift*, 1884, p. 22.

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**CODEINE JELLY**.—Dr. G. S. Mahomed draws attention to a preparation in the form of jelly containing codeine, citric acid, tolu, and glycerin, which he found a pleasant and serviceable agent in the treatment of chronic laryngitis, phthisical cough, etc.—*Brit. Med. Jour.*

## THE HOMOQUININE OF CUPREA BARK.

BY B. H. PAUL AND A. J. COWNLEY.

The very important contribution to the chemical history of the remarkable substance occurring in cuprea bark, which has been furnished by Dr. Hesse in the paper published in the "Annalen" for July last,<sup>1</sup> well entitles him to the gratitude of those who first recognized its individuality, and as among that number, we desire to express our sense of obligation to him for the use he has made of his superior opportunities for investigating this subject. Certainly the substance in question is deserving of some consideration, for in addition to its own peculiarities, and the fact that it was independently and simultaneously discovered by four distinct sets of observers, it has been subjected more than the common run of "new bodies" to the struggle for existence, which is perhaps the best test of fitness. In the first place, Dr. Hesse is responsible, perhaps, for the non-publication of the observation made by his colleague Mr. Tod, in June, 1881, that cuprea bark contained a hitherto unknown alkaloid, and he was certainly disposed to doubt the distinct nature of the crystalline substance we obtained from that bark until we placed a small specimen of it in his hands for examination. Dr. Kerner and Dr. De Vrij pronounced the crystals of homoquinine sent to one of them by Mr. David Howard to be a mixture of quinine and cinchonidine, and lastly, Messrs. C. H. Wood and Barrett illustrated the dangers attending the use of the imagination in scientific matters by putting forward a suggestion implying that the substance, which indeed, Dr. Hesse infers, they do not seem ever to have seen, might be a compound of quinine with quinidine. Nevertheless, homoquinine has survived, though the difficulty of obtaining a supply of material for investigation has hitherto been a serious obstacle with those who would otherwise have studied it more completely.

Dr. Hesse has long since recognized the fact that cuprea bark contains a peculiar crystallizable alkaloid,<sup>2</sup> and he has now, in the most practical manner, made amends for his former disbelief by giving an elaborate history of this substance and its compounds, which places it beyond question. At the same time, however, we regret to find he has done this with some degree of hankering after the opinion he first

<sup>1</sup> A translation of this paper appeared in the "Pharmaceutical Journal" for August 23, p. 141, and was reprinted in "Amer. Jour. Phar.," Oct., p. 515.

<sup>2</sup> "Berichte," xvi, 60, and "Pharm. Journ." Feb., 1883, p. 685.

expressed and that he suggests, as it were, as an apology for having confirmed the existence of homoquinine, the possibility of quinine becoming "modified" under certain conditions and then behaving as a distinct alkaloid.<sup>1</sup>

We had long been aware that, in operating upon homoquinine with a view to its purification and the preparation of salts, there was sometimes an apparent disappearance of the substance, as it were, under one's hands, in a way that was unaccountable, and that then the presence of quinine, or of an alkaloid resembling it in solubility in ether, could be recognized in the solutions; but we had always ascribed this latter circumstance to the admixture of quinine with our material and the small quantity of that at our disposal prevented the further settlement of this point. Another circumstance, which at first seems slight, seems to lend considerable probability to Dr. Hesse's statement as to the convertibility of homoquinine into quinine, was the failure of all attempts to detect that substance in commercial quinine sulphate manufactured from cuprea bark. With a view to obtain a workable quantity of homoquinine we have repeatedly examined samples of quinine sulphate which we had every reason to believe had been derived from cuprea bark, and within the last few weeks have taken advantage of an opportunity to repeat the attempt with material of this description; but in every instance we have failed to obtain the faintest indication of the presence of homoquinine. But with every respect for the trustworthy nature of Dr. Hesse's observations, so far as they go, we must confess that our own experience in dealing with this remarkable substance made us hesitate before accepting unreservedly the statement that it is a modification of quinine and capable of being converted into quinine by the action of caustic soda. Upon receipt of Dr. Hesse's paper, therefore, we at once proceeded to follow out the treatment he describes for effecting the conversion of homoquinine into quinine. A quantity of the crystalline substance, obtained by treating the crude sulphate from cuprea bark with ammonia and ether, was first recrystallized several times from ether in order to separate any adherent quinine, and an acid solution of the purified substance was mixed with a 10 per cent. solution of caustic soda in excess and some ether. The alkaloid at first precipitated was completely dissolved on agitation, the ether solution, as well as the alkaline liquor becoming perfectly clear. After the lapse of several hours there was, however, no separation of

<sup>1</sup> See October No., p. 524.



crystals from the ether solution, as would have been the case with even a very dilute solution of ammonia had been used in place of caustic soda. Upon separating the ethereal liquor, neutralizing the alkaloid contained in it with sulphuric acid and evaporating, a crystalline sulphate was obtained, which when tested in the usual way with ether and ammonia behaved exactly like quinine sulphate, no vestige of homoquinine crystals being formed even after the lapse of several days. This result appeared to be exactly the same as that obtained by Dr. Hesse, except in one particular, viz., that it was not obtained by degrees, as Dr. Hesse's description would suggest, but at once and without any need for the "repeated precipitations" mentioned by Dr. Hesse. This discrepancy led us to repeat the experiment several times, invariably, however, with the same result, which seemed to be conclusively opposed to the doubt we entertained as to the conversion of homoquinine into quinine. But on further consideration of the matter and having, as is our general practice, regard to the quantitative relations of the experiment, we observed that the quantity of alkaloid permanently soluble in ether thus obtained was never more than about one-half that of the homoquinine operated upon. The solubility of quinine in solution of caustic soda is too slight to account for this deficiency. Still we found that on adding to the caustic soda liquor with which the homoquinine had been treated in these experiments, sufficient sulphuric acid to make it faintly acid, there was a copious precipitation of a crystalline sulphate, the quantity of which accounted for the deficiency above mentioned. The alkaloid contained in this salt was not quinine; it crystallized readily from solution in ether in rhombic plates, larger and more massive than the ordinary crystals of homoquinine and otherwise presenting a character distinctly different from them. The alkaloid thus obtained was again treated with caustic soda solution and ether, but it gave no evidence of being thus convertible into quinine; the whole of it remained dissolved in the soda solution and was easily obtained again in the crystalline state by subsequent treatment in the ordinary way with ether and ammonia. Heating this base with caustic soda solution also failed to render it permanently soluble in ether or to affect its capability of crystallizing from ethereal solutions. On re-examination of the caustic soda liquors separated in the various repetitions of this experiment we found that after having been exposed some time and undergone evaporation they presented the appearance of



a thick jelly, another point which marks the alkaloid soluble in caustic soda solution as peculiar and one hitherto unobserved.

At present we are not in a position, from dearth of material, to carry our examination of this subject further, but the results above described are, we think, sufficiently definite to justify our dissent from Dr. Hesse's statement that homoquinine is a modification of quinine and that it is completely convertible into quinine. The more precise interpretation of these results must be left until we are able to obtain a more adequate supply of material than the two or three grains of homoquinine crystals we have operated upon hitherto. It may, however, be suggested that these results, taken together with those by which Dr. Hesse has proved the individuality of homoquinine, furnish evidence that this latter alkaloid is susceptible of being split into two other alkaloids, one of them being either quinine or a base closely resembling it, the other an alkaloid not hitherto observed, to which we will provisionally give the name of "cupreine." Our results also explain why homoquinine is not found in the commercial quinine sulphate made from cuprea bark.—*Phar. Jour. and Trans.*, Sept. 20, 1884.

**Antipyrine** is the name given by Dr. Knorr of Munich to an alkaloid, prepared by him synthetically from coal tar. It contains oxygen, appears in commerce in the form of a white crystalline powder, somewhat resembling salicylic acid in appearance, is inodorous and nearly tasteless, and is freely soluble in water; it combines with acids, forming salts from which alkalies liberate the base. Antipyrine is colored intensely red by ferric chloride and other oxidizing agents, the effect being produced even by dust containing iron, which causes red spots upon the crystalline powder; it requires therefore to be kept in well closed bottles, which should also be protected from the light, since long continued exposure to light causes likewise a red tinge.

The alkaloid has been found, by Prof. Filehne of Erlangen and by other physicians, to be an excellent remedy in high fevers for lessening the temperature  $2^{\circ}$  or  $3^{\circ}$  C. without producing other unpleasant effects and mostly without sudorific action; from 3 to 5 Gm. are required for this purpose, and are divided into three doses, to be given in intervals of one hour, previously dissolved in water or wine. The dose of antipyrine may be stated to be 1 to 2 Gm. for adults, and 0.5 to 1 Gm. for children.

## BARK OF "BOIS PIQUANT."

BY E. HECKEL AND F. SCHLAGDENHAUFFEN.

The bark examined was the variety peculiar to Guiana, and agreed exactly with Guibout's description of *Zanthoxylum caribæum*. Its anatomical structure is entirely different from that of angustura bark, which it resembles in external appearance. When macerated with water, it yields a bitter, slightly acid, yellow solution, which turns brown with ferric chloride, and yields an abundant yellow precipitate with mercuric chloride, stannous chloride, tannin, picric acid, double iodides, or phosphomolybdic acid, but gives only a slight turbidity with lead acetate. Nitric acid produces a deep red color. When extracted with light petroleum, the bark yields a considerable quantity of chlorophyll, fat, and wax, together with a crystalline substance which can also be extracted by alcohol. This substance forms colorless needles of the composition  $C_{12}H_{24}O$ , which melt at  $285^{\circ}$ , and gives no coloration with nitric, sulphuric, or hydrochloric acid.

If the alcoholic extract, after separation of these crystals, is diluted with water, mixed with lime, evaporated to dryness, and the residue extracted with boiling alcohol, a second crystalline substance is obtained which resembles the vegetable alkaloids in its general properties. It exists in the bark only in very small quantities. With nitric acid, it gives a deep-red coloration, but if the liquid is evaporated on a water-bath and mixed with stannous chloride, no violet color is produced. Sulphuric and hydrochloric acid have no action on it, but sulphuric acid and potassium dichromate, manganese dioxide, or lead dioxide, produce a violet coloration similar to that produced by strychnine mixed with a little selenium. An alcoholic solution of bromine also produces a deep blue coloration which persists for a long time. Five mgrms. of this alkaloid injected in aqueous solution beneath the skin of a frog, produce rapid general paralysis, followed by death in about half an hour, and similar effects are observed with rabbits and guinea-pigs.

A nitrogenous resinous substance, soluble in water, was also obtained from the bark. It has the general properties of the alkaloids, and in its physiological action very closely resembles the crystalline alkaloid just described, although it differs from it in physical properties. None of the so-called xanthopierite could be obtained from the bark.—*Compt. rend.*, 98, 996–998; *Jour. Chem. Soc.*, August, 1884, p. 848.

## A GLUCOSIDE FROM BOLDOA FRAGRANS.

BY P. CHAPOTEAUT.

The leaves of *Boldoa fragrans* are treated with boiling alcohol, the solution evaporated to dryness, and the residue extracted with very dilute hydrochloric acid in order to remove the alkaloid described by Bourgoin and Verne. The liquid, freed from the greater part of the mucilaginous matter, is then treated with ether or chloroform, and this ethereal or chloroform solution, on evaporation, leaves a transparent amber-colored syrup with an aromatic taste and smell. This substance, which exists in the leaves to the extent of 0.3 per cent., has the composition  $C_{30}H_{52}O_8$ , and can be distilled in a current of steam, but cannot be distilled without decomposition in a vacuum or in a current of hydrogen. When heated with very dilute hydrochloric acid, it yields glucose, methyl chloride, and a syrupy substance of the composition  $C_{19}H_{28}O_3$ , which dissolves in alcohol and benzene, but is insoluble in water. If the benzene solution is treated with sodium, hydrogen is evolved; and if the sodium-derivative thus formed is treated with alcoholic iodides, methyl or ethyl-derivatives can be obtained. The substance,  $C_{30}H_{52}O_8$ , is therefore a glucoside or, rather, an ether in which glucose plays the part of an acid. The constitution of the alcoholic constituent has not yet been ascertained.

When the glucoside is injected under the skin of a guinea-pig, or taken into the stomach of a dog, it produces a quiet sleep of longer or shorter duration. If injected into the blood of the dog, it excites and increases the secretory functions, especially the secretion and excretion of bile, saliva, and urine.—*Compt. rend.*, vol. 98, p. 1052–1053; *Jour. Chem. Soc.*, August, 1884, p. 845.

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**Tin in Preserved Food.**—E. Unger (*Dingl. polyt. J.*, 251, p. 192) found that asparagus preserved in tinned boxes contained 0.019 to 0.033 per cent. tin near the sides, and from 0.021 to 0.033 per cent. in the centre of the boxes. The tin was present in the form of a proto-salt. The acid juice of pressed apricots and strawberries was found to be free from tin, whilst the fruit contained this metal; apricots gave 0.0185 per cent. tin, and strawberries 0.0175 per cent.—*Jour. Chem. Soc.*

## CHEMISTRY OF PLANTS.

BY M. BALLO.

The author previously showed that in aqueous solution of carbonic anhydride, the latter exists as hydroxide, and he concludes therefore that this is the form in which it becomes assimilated by plants. He finds that the reduction of carbonic anhydride to formic acid can be effected not only by the action of potassium on the moist gas, but also by the action of an energetic reducing agent (sodium-amalgam) on alkaline hydrogen carbonates, and on calcium hydrogen carbonates, this being of interest in connection with plant chemistry through the wide distribution of the later salt in water. Glycollic acid, which has been shown to occur in unripe grapes, and also tartaric acid have been obtained by the reduction of oxalic acid (*Bull. Soc. Chim.*, vol. 27, p. 3; *Annalen*, vol. 166, p. 124). Tartaric acid has likewise been shown by Liebig and others to be an oxidation-product of most of the carbohydrates, and by reversing the process (*i. e.*, by reduction) it might therefore be better suited to the formation of these substances than carbonic acid. Whilst a portion of the oxalic acid of plants serves to decompose calcium sulphate, by far the greater portion must give rise to the production of glycollic and tartaric, or of malic and succinic acids. The conversion of formic acid (which is assumed to be the first reduction-product of carbonic acid) into oxalic acid in plants, is probably brought about by nitric acid; it is found that nitric acid does effect this conversion if the reaction be stopped when red fumes begin to be evolved. The author believes that this is the reason why nitrogen must be presented to plants in the form of nitrates; a portion of this is no doubt reduced to ammonia, a second portion probably to nitrous acid, whilst the greater part is reduced to nitric oxide, which, by the action of oxygen and water, becomes reconverted into nitric acid.

The reduction of oxalic to tartaric acid may be assumed to be effected by the coalition of two oxalic acid molecules, or of one molecule oxalic acid with one molecule glycollic acid; whilst the production of acids containing an uneven number of CH.OH-groups can be explained by formic acid taking part in the reaction. By the further reduction of the acids, alcohols are produced. It is not yet understood in what way the salts act in the vegetable and animal organisms, but



the author thinks it possible that they assist in bringing about the formation of the more complicated products.

By the action of sodium on an ethereal solution of chlorhydrin, a hexyl alcohol,  $C_6H_{10}(OH)_4$  (*glycerythrol*), is obtained, homologous with erythrol. It is soluble in water and alcohol, insoluble in ether, and forms a thick yellowish syrup of bitter taste.—*Ber.*, vol. 17, p. 6—12, and *Jour. Chem. Soc.*, p. 765, July, 1884.

## ON IODINE IN COD LIVER OIL AND OTHER MARINE PRODUCTS.

BY EDWARD C. C. STANFORD, F.C.S.

In a paper on this subject read before the Pharmaceutical Conference at Southport, last year, I found the proportion of iodine in cod liver oil to be much less than the results published by other observers. (See "*Amer. Jour. Phar.*," 1883, p. 612)

Taking the average of six samples from different sources, I found them to vary from '000138 per cent. to '000434 per cent., the average being '000322 per cent. The amount contained in the fresh liver was more than twice as much, '000817 per cent. Since then I have had the opportunity of examining two genuine samples, of which I know the origin, with the liver from which these have been extracted; one was sent me by Mr. Gale, of Messrs. J. Bell & Co., and the other was made by myself. I obtained 14 ounces of oil and a little water from  $2\frac{1}{2}$  lbs. of liver. All were examined for iodine with the following results:

	Per cent.
Cod liver oil, Gale, filtered.....	'000040
“ “ “ “ unfiltered.....	'000052
“ “ “ “ marc.....	'000200
“ “ “ Stanford.....	'000077
“ “ “ “ marc.....	'000765
“ “ “ “ water.....	'000680

I think, therefore, from the analyses of these oils of known origin, we are justified in the conclusion that iodine has little to do with the therapeutic value of the oil.

*Oysters.*—It is commonly supposed that these delicious esculents are

rich in iodine. The Anglo-Portuguese variety has been specially reported on. These oysters are obtained from about thirty miles of coast extending from Lisbon to Cacillias Point, and are nursed and fattened in England.

Dr. Champouillon, of Paris, published a report on these oysters in 1876, from which the following is an extract:

“Oysters fattened on the English coast and submitted to the same analytical processes are found to be far less rich in iodine and bromine than those of Portugal. These latter, owing to their special constituents, represent a valuable dietary article of a nature to prevent scrofula, ganglionic gathering, rachitis and perhaps also phthisis, among classes condemned to physiological misery by the very conditions of their existence. The Portuguese oyster deserves therefore to engage the attention of medical men.”

He found that 1 kilo gave 760 grams of water and .039 gram of iodine, and .062 gram of bromine, or iodine .0039 per cent. and bromine .0062 per cent. My attention was called to this report at Southport, and I took some trouble to secure a supply of genuine Anglo-Portuguese oysters. The amount of iodine found was .00004 per cent. or 4 parts in ten millions. Whatever, therefore, may be the value of oysters in the maladies alluded to above, we may be permitted to doubt if any of these advantages are due to the iodine contained therein.

*Sponge.*—Spongia usta, or burnt sponge, was long used as a medicine, and was formerly official in the Dublin Pharmacopoeia. According to Pereira, it was employed “as a resolvent in bronchocele and scrofulous enlargement of the lymphatic glands. Its efficacy is referable to the presence of iodine and bromine.” The tests employed show that the iodine was the element required in it.

Herberger found in it, iodide of potassium, 1.16 per cent. = iodine, 0.887 per cent.; bromide of potassium, 0.702 per cent. = bromine 0.48 per cent. and traces of copper.

Preuss found, iodide of potassium, 2.14 per cent. = iodine, 1.636 per cent., and bromide of sodium, 0.76 per cent. = bromine, 0.59 per cent.

Posselt found 3.59 per cent of ash.

Cookewit found 3.7 per cent. of ash and 1.09 per cent. of iodine, also 0.50 per cent. of sulphur and 1.90 per cent. of phosphorus.

I am indebted to Mr. D. Frazer, of Glasgow, for a supply of fine sponges, and I append the results of analyses of these.

	Fine Turkish.	Honeycomb.
Water.....	19.40	19.40
Organic matter.....	69.39	50.24
Ash soluble in water.....	2.21	3.70
Ash insoluble in water..	9.00	26.66
	100.00	100.00
Iodine.....	.200 = 4.48 lbs. to ton.	.054 = 1.2096 lbs. to ton.
Iodine on sol. salts...	9.050	1.460
Per ton of salts.....	202.7 lbs.	32.7 lbs.
On the total ash.....	0.1779 per cent.	1.7841 per cent.
Per ton of ash.....	4 lbs.	39.96 lbs.

The salts contained only a trace of potash, as free alkali, chloride of sodium and sulphate of lime. Turkey sponge is therefore very rich in iodine, but its value per lb. is unfortunately about twelve times that of iodine. The insoluble ash is principally sand. I hope to give some further details of this ash later on. The sponge was carbonized and the salts extracted from the charcoal. I have shown in a former paper, that the iodine is rapidly volatilized when an organic compound containing it is burnt to complete ash, especially in the presence of silica. I will only add that it will afford me much pleasure to examine any home grown sponges or other marine products that may assist our knowledge of the distribution of iodine, if any of our members who reside near the sea will favor me with samples of not less than 5,000 grams.—*Phar. Jour. and Trans.*, Sept. 20, 1884, p. 233.

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**Hyoscine.**—Ladenburg has shown that on boiling hyoscine with alkalis or baryta, it is resolved into tropic acid and pseudotropine, a base isomeric with tropine. Both products have been further examined by A. Ladenburg and C. F. Roth (*Ber.*, 17, 151–152). *Pseudotropine* crystallizes in rhombohedrons, melts at 106°, and boils at 241–243° (tropine crystallizes in the rhombic system, and melts at 62°); it is less hygroscopic than tropine, is very readily soluble in water, readily soluble in chloroform, sparingly in ether. Proof of the identity of the tropic acid from hyoscine with that from other sources was obtained by its conversion into atropine when treated with tropine and hydrochloric acid.—*Jour. Chem. Soc.*

## THE BEE-KEEPING INDUSTRY IN AMERICA.<sup>1</sup>

BY JOHN L. DOW.

In nothing has there been greater progress displayed throughout America during the past half-dozen years than in the keeping of bees. Formerly success in bee-keeping was attributed largely to "luck," and the variety of systems practised by different bee-keepers was only equalled by the multiplicity of designs adopted in the construction of the hives. A specialty of the American farm, as seen to-day, is its apiary, as the rows of hives are called, which are marshalled along at distances of from five to seven feet from each other in some convenient situation near the garden or orchard. And what arrests attention is the similarity of pattern in these square white painted hives. From California to Massachusetts one would think that the keepers of bees had obtained their hives from one maker. You find, however, that nearly every State has its own special make of beehives, but the differences are only in detail, and do not interfere with the general plan that seems to govern these square boxes. We eventually discover that bee-keeping in America is now everywhere reduced to principles that are as much distinguished for their certainty of operation as formerly the occupation was noted for being one essentially of guess-work.

Although bee-keeping to the extent of apiaries comprising from a dozen hives or so up to about fifty is general among the farms and orchards, the big bee ranche, whose proprietor devotes his whole attention to the industry, is also quite an established American concern. It is estimated that for the year 1882 there were 70,000 bee-keepers in the United States, possessing among them a total of 2,000,000 hives, averaging 20 lbs. of honey each, which at the low average of 10 cents per lb. represented a total of \$4,000,000, besides 20,000,000 lbs. of wax, worth \$6,000,000, or a total for the year's crop of \$10,000,000. Of these amounts, honey and wax to the value of \$1,200,000 and \$700,000 respectively were exported for the same year. Among the bee-keepers in the Eastern States the work of what is called "wintering the colonies" is a very serious portion of the bee-keepers responsibility; but in the more genial and Australian-like climate prevailing along the Pacific Coast, between San Francisco and Mexico, the bee

<sup>1</sup> From the *Leader*. Reprinted from the *Tropical Agriculturist*, August 1, 1884.



industry is carried on under the most favorable conditions. In Los Angeles County, Southern California, there are two hundred apiaries, aggregating 12,000 hives, from which it is estimated that an average of 500,000 lbs. of honey is taken annually; and one large producer, Mr. J. S. Harbison, sent through to New York on one occasion a consignment of honey and wax amounting to ten ear loads of 20,000 lbs. each, or 200,000 pounds in all. Among individual yields vouched for at Los Angeles is one where from a single hive during the season 566 lbs. of honey was taken, some of which, owing to its purity and the superior manner in which it was got up for market, reached 50 cents per lb.

The square box form of the hives that has already been alluded to, was adopted as far back as 1851, almost about the same time by the American and German bee-keepers, Langstroth and Dzeron respectively, to admit of working their movable comb improvement, an invention which has led the way to all the recent bee-keeping improvements. It is strange that the complete revolution in bee management effected by the early discoveries of these two men should only have taken place within the past few years; and it is no less notable that in 1883 the Langstroth hives are making their way all over America with little alteration in their design to those first submitted by Mr. Langstroth in 1851. Instead of the old straw hive, in which the bees were smothered previous to the honey being promiscuously tumbled out, all mixed up with larvæ, wax and broken comb, the modern hive is fitted with square frames, which can be lifted out and dropped in again at will, just as panes of glass are handled in a glazier's box. These frames are what the bees build their comb upon, and set to work at filling with "extracted" or "box" honey respectively, just as their owner may desire.

Extracted honey is that which is separated from the comb, and box honey the kind that is sold in boxes holding a pound or so of honey, and in the form that it comes from the hive. For extracted honey, full sized frames are used in the hive, but for box honey the frames are subdivided into the boxes within which the bees are to construct the honey-filled comb in the shape intended for market. When the full frames are charged with honey, another achievement in the new bee-keeping system is brought into operation, viz., the honey extractor. This is an ingenious contrivance, resembling in appearance the square frame of a street lamp, the sides of which are fitted with honey-

charged frames from the hives, and the whole then inserted within an enclosure like an oil drum, fitted with a tap. The apparatus, with its frames of honey, is fitted into pivots above and below, and is then swiftly rotated by a tooth and pinion attachment. The honey, by centrifugal force, is thus thrown from the frames, and is drawn off by the tap in the enclosing drum.

“Comb foundation” is another of the improvements. The bees, it appears, if left to themselves, not only occupy too much of the honey-making season in comb building, but also work up too much valuable material to suit the commercial notions of the modern bee manager. Honeycomb is made of pure wax, which the working bees exude from minute folds of their bodies in the shape of thin flakes or scales. It is estimated that every square inch of comb built by the bees is done at the expense of from fifteen to twenty times its weight in honey. Thus the bee-keeper resorts to comb foundation, and by saving the bee the work of making it, obtains the extra honey. A little machine with iron rollers, resembling in form the wringer in a clothes washer, is used to roll out beeswax into thin sheets of comb foundation. These are fastened on the frames, and the frames dropped into their places in the hive, when the bee proceeds at once to business.

At first, comb foundation was not a success, and it was discovered that the hitch occurred in the sheets being rolled out plain. The bees would not work because they could find no trace of cells. Then an enterprising inventor engraved his rollers, so as to stamp the sheets of beeswax with a perfect imitation of the bees' cells, when, thenceforth, the busy little insects buckled down to work with as much satisfaction as if they had made the sheets themselves. Some bee-keepers roll out their own foundation, but most obtain it from one of the many suppliers of bee-keeping requisites that are to be found all over the United States. Here is one of their advertisements:—“We are prepared to promptly fill all comb foundation orders at the following prices—one to ten lb., 55 cents per lb.; fifty lb. or over, 50 cents per lb.; 100 lb. or over, 45 cents per lb. Our largest sheets are 12 × 12 inches, and run from 5 to 8 square feet to the pound. In ordering give inside dimensions of frames. If ordered by mail add 25 cents per pound to above charges for postage and extra packing; samples by mail, post paid, 5 cents.”

Another triumph of the new system is the “smoker,” by which the most nervous person can handle and work among the bees with the

utmost safety. Formerly a few individuals in a locality were regarded with considerable veneration, owing to their possession of a supposed mysterious influence that prevented bees from stinging. The whole art of bee taming is now found to consist in the fact that bees will not sting when filled with honey; that to get them to fill themselves it is necessary to frighten them, and that the necessary frightening is effected by puffing a little smoke into their hives. For this purpose the smoker, which is a pointed tin funnel filled with smouldering rags and having a small bellows attached, forms one of the bee-keeper's indispensable tools of trade. The handy manner in which the bees can be inspected by puffing a little smoke into the hive, and then lifting out any section of the movable combs, enables the condition of the colonies to be constantly noted.

The first step on the part of new beginners in bee-keeping is to post themselves in the interesting study of bee physiology by obtaining one of the numerous books on the subject. The best works among American publications are:—King's "*Bee-Keeper's Text-Book*," Langstroth's "*Bee Book*," Quinby's "*New Bee-Keeping*," Root's "*A. B. C. of Bee Culture*," and Cook's "*Bee-Keeper's Guide*." A prosperous hive or colony of bees consists of a fertile queen, a few hundred drones and about 40,000 workers. The queen is the prolific parent of the whole colony, and laying eggs is the sole end of her existence. In the height of the honey gathering season, and under favorable circumstances, the queen will deposit about three thousand eggs per day. She is distinguished from the other bees by being larger and having smaller wings. The drones are bulkier than the queens, but shorter, and have large wings, but are destitute of a sac for carrying honey and incapable of performing the duties of the workers. Their business is the fertilization of the queens, and as impregnation is effected while on the wing, the drones leave the hives in considerable numbers about noon on fine days, and are followed by the young queens. When the service of fertilization is supposed to be accomplished, the workers drive out the drones and keep them out till they die of starvation.

One of the many advantages of working the movable comb hive is that all excess of drone comb (which differs from the honeycomb) can be removed, and the production of useless consumers thus kept in check. The workers are the smallest in size of the three classes of bees, and, although females, are incapable of fertilization by the drones, so that, although they occasionally lay eggs, these never produce



working bees. Upon the workers devolve all the labor of building comb, collecting the honey and feeding the queen and brood. Their average age varies from a few weeks in summer to from six to nine months during the remainder of the year. The queen's average age is from three to four years, and should her death occur the workers construct large cells, supplying them with what is described as "royal jelly," so that the eggs or larvæ that otherwise would have produced worker bees are developed into queens. Only one queen is allowed to remain in each hive. The queen usually leaves the hive when about five days old to meet the drones in the air for fertilization, which, being accomplished, serves her for life, as she seldom afterwards leaves the hive, excepting in company with her first swarm.

The average time from the laying of the egg to the appearance of the perfect insect is for the queen sixteen, for the worker twenty-one, and for the drone twenty-four days respectively. The cells in which the workers are reared are the smallest in size; those for the drones nearly one-third larger, and for the queen still larger and of peculiar form, requiring as much material for their construction as fifty worker cells. In strong colonies, having plenty of stores, the queen will often deposit eggs during every month in the year, the least brood being during the three winter months. On the approach of spring an increase of brood rapidly sets in, and the bee-keepers prepare for their annual harvest of swarms and surplus honey. From three to ten queen cells are generally constructed in each hive, and in about eight days after the first queen leaves with the first swarm the next queen is ready to emerge from her cell.

An important feature in connection with the movable comb system of bee management consists in the old chance method of swarming being supplanted by what is called artificial swarming. Instead of the bees being left to swarm naturally, with the risk of being lost, the swarming is conducted at the will of the operator by the removal of the queen to a new hive, where she is followed in a most docile manner by the swarming bees. Another important advantage that the new system of bee-keeping affords consists in what is called nucleous swarming, by which a queen is reared amid a small cluster of bees in a separate hive until she matures and becomes fertilized, when the hive that is to be swarmed is shifted, and the nucleous hive put in its place. In this way the surplus bees from the shifted hive go out as usual, to their work of honey gathering, and according to the law which directs them



back to the exact spot of their old habitations, take possession of the new hive and continue their operations under the new queen that they found established there to receive them. The chief gain made by this expedient is one of time, a commodity that is of special value during the honey season.

The introduction of a fertile queen to a colony is often in this way effected a fortnight earlier than they would swarm naturally, and this in a large apiary amounts to a very considerable aggregate gain. Sometimes the facilities presented by the movable comb system are called into requisition for quite a contrary operation, viz., the prevention of swarming when an increased amount of honey may be desired instead of multiplied stocks. When this is the case the frames are lifted out until the queen is found, when one of her wings is clipped, thus preventing her from flying away, and consequently putting a stop to the swarming. In preparing for wintering the bees also it is a common practice to join two colonies, so as to get through the non-producing season upon the most economical terms; a full hive, owing to being able to maintain the proper degree of warmth, requiring less food. All such handlings as these various processes involve are enabled to be carried out under the movable comb system with the utmost certainty and exactness of operation. Further details with respect to varieties of bees, bee pasturage, and other matters, will have to be dealt with in another paper.—*Phar. Jour. and Trans.*, September 27, 1884, p. 249.

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**Bromine as a Disinfectant.**—(A. Frank, *Dingl. polpt. J.* [249], p. 167). The bromine is soaked up by infusorial earth, and is conveniently placed in a Brüner's pan of glass or porcelain, instead of lead, having a very deep depression in the cover.

The water sealing the joint of the lid becomes charged with bromine from the interior, whence the bromine gradually diffuses into the room. To accelerate the rate of diffusion, warm water may be poured into the depression in the centre of the cover.

Frank recommends petroleum to reduce the action of bromine on organic substances with which it may come into contact, or to quickly remove its odor.—*Jour. Chem. Soc.*

# MILK.

BY E. DUCLAUX.

The albuminoïd matter in milk may be divided into *colloidal casein*, *casein in suspension*, and *soluble casein*, the latter being capable of passing through biscuit earthenware. Small battery cells give good results, but the larger cells do not yield a filtrate of constant composition, even from the same milk, in consequence of inequalities in the earthenware. This method of filtration separates those substances which are in suspension, *i. e.*, fat, casein, etc., from those which are in solution, *i. e.*, sugar, inorganic salts, etc. The original milk and the filtrates were examined by the methods described in the author's memoir (*Ann. de l'Institut Agronomique*, 1879-1880). The following results were obtained with a sample of Cantal milk :

	In suspension.	In solution.
Fat.....	3.32	.....
Sugar.....	.....	4.98
Casein.....	3.31	0.84
Calcium phosphate.....	0.22	0.14
Inorganic salts.....	.....	0.39
	<hr/> 6.75	<hr/> 6.35

In this case, the soluble casein is about one-fifth of the total casein, but the proportion is rarely so high ; in Cantal milk, the amount of soluble casein varies between 4 and 6 grams per litre ; this proportion remains approximately constant, and does not sensibly change, even when the milk is kept for a considerable time. It is only slightly affected by the action of heat ; the filtrate becomes turbid on boiling, but the precipitate is very slight, and gradually redissolves. The action of heat on the other two varieties of casein causes them to agglomerate, and the deposit inside the porous cell after filtration is always more compact if the milk has been boiled. Slight acidity causes a portion of the colloidal casein to pass into the suspended condition, and slight alkalinity converts some of the suspended casein into the colloidal form, but neither of these conditions has any effect on the soluble casein. The proportion of soluble casein in normal milk is not only approximately constant, but seems to be independent of the nature of the milk, and is sensibly the same in the milk of cows from various districts, in goats', asses', and human milk. The proportion of soluble casein is increased to a slight extent by the addition

of water, and to a much greater extent by the presence of the diastase to which the author has previously given the name *casease*. In one case the porportion of soluble casein was 0.61 per cent., but under the influence of casease it increased in 8 hours to 1.80, and in 24 hours to 2.20 per cent., after which it remained constant, one-third of the total casein being still in the colloidal condition. The destruction of the equilibrium thus established required a very much longer time, or the addition of a further quantity of casease. The casein can be more quickly converted into the soluble form by addition of some of those microbes which produce casease (*loc. cit.*), and which continually secrete this substance, whilst at the same time they use up the casein already existing in the soluble form for their own nourishment. The secretion of the casease is in fact the means by which these microbes prepare their own food at the expense of the suspended and colloidal casein and is strictly analogous to the action of the pancreatic juice in the higher animals.

Hammarsten supposed that the action of rennet on milk is to split up the casein into two new albuminoids, one of which is insoluble in presence of the calcium phosphate contained in the milk, and carries down a portion of this phosphate with it, whilst the other, corresponding to lacto-protein, and called *whey-protein* by Hammarsten, remains in solution. The author treated milk with rennet free from casease, care being taken to prevent the access of bacteria as far as possible, and examined the resulting liquid by the filtration method. The result of one out of a number of experiments are given in the following table:

	In suspension.		In solution	
	Milk.	Whey.	Milk.	Whey.
Fat.....	4.30	0.85	.....	.....
Sugar.....	.....	.....	5.37	5.73
Casein.....	3.53	0.46	0.37	0.36
Calcium phosphate.....	0.23	.....	0.17	0.17
Inorganic salts.....	.....	.....	0.40	0.43
	8.06	1.31	6.31	6.69

The proportion of soluble casein and of dissolved calcium phosphate is the same in both the milk and the whey. The suspended calcium phosphate is however, carried down together with the fat and the casein in the curd. Hammarsten's supposition is, therefore, not confirmed by experiment, since the amount of soluble casein is not

increased, and the calcium phosphate plays no active part in the formation of the curd.

From the above table, it appears that 0.46 of the colloidal casein has not been converted into the solid form, and it is found that the whole of the coagulable casein is never precipitated, although the amount remaining in solution diminishes if the proportion of rennet is increased. Milk may be regarded as a system in which the three forms of casein are in equilibrium, this equilibrium being disturbed by the addition of minute quantities of inorganic salts, ferments, etc. Coagulation corresponds to the slow and regular production in a liquid mass of a state of equilibrium which requires the solidification of a dissolved substance, but there is no evidence to show why part of the casein should be precipitated in presence of rennet. The explanation is not to be sought in any specific properties of rennet, for other substances produce the same effect, nor in the specific properties of casein, since other bodies, such as oxide of iron, can exist in the same three states. Coagulation, in fact, appears to be simply a problem in molecular mechanics which cannot be solved in the present state of our knowledge.—*Compt. rend.*, 98, 438-441, and 526-528; *Jour. Chem. Soc.*, July, 1884, p. 762.

**Determination of the value of extract of malt.**—H. Tiesler, St. Petersburg, examined eight samples of malt extract by Jungk's method ("Amer. Jour. Pharm.," 1883, p. 291) for determining the diastatic value. In order to avoid the possible liquefying action upon starch of the free acid present, this was neutralized with baryta water. Five of the samples contained no diastase, the remaining three variable proportions of the same. The rapidity with which the malt extracts liquefied starch paste was estimated by means of a flat vessel having on the bottom a short thin discharge pipe through which in one minute 46.56 Ccm. of distilled water of 15° C. would run off. The mixtures of malt extract and starch were digested for a certain length of time, then rapidly cooled to 15° C. and carefully strained, when one sample discharged after one minute's action 44.57 Ccm., and after twelve hours 45.37 Ccm., while the other sample discharged only 37.01 and 40.89 Ccm. respectively.

The author advises also the concentration of malt extract, so that it contain not less than 80 per cent. of dry matter. In dilute solutions the diastatic power is more or less rapidly decreased.—*Phar. Zeitschr. f. Russl.*, 1884, pp. 297-301.



AN IMPROVED METHOD OF PREPARING OINTMENT  
OF SALICYLIC ACID.

BY BALMANNO SQUIRE, M.B.,

*Surgeon to the British Hospital for Diseases of the Skin.*

Salicylic acid ointment is now largely used, not only as a dressing to surgical wounds in the "*antiseptic*" or "*Lister*" treatment of them, but also as a local remedy in one of the commonest of the diseases of the skin, namely in eczema. Any improvement in its mode of manufacture may therefore prove a general advantage.

I find that salicylic acid is soluble in hot lard (at water-bath temperature) in about the proportion in which it is usually prescribed, that is to say at the rate of thirty grains of the acid to an ounce of lard. I mention this fact because I have before ventured in this JOURNAL to suggest to pharmacists a systematic investigation on their part of the solubility of ointment remedies in hot lard, and on this ground, namely, that I find as a matter of my own experience that a remedy which has undergone *solution* in the lard that it is prescribed with is much more vigorous in its action on the skin or on a wound than when it has been merely *mixed* with cold lard; the ointment becomes also of better appearance, although that is a minor matter.

In the case of chrysophanic ointment, I suggested that after its preparation by solution of the acid in hot lard the ointment should, after cooling, be well mixed with the pestle and mortar on account of the tendency of the particles of the acid (minutely precipitated during the cooling of the ointment) to collect towards the surface, more especially at the edges of the surface.

I observe that the same phenomenon occurs during the cooling of salicylic ointment that I have noted in the case of chrysophanic ointment, so that the pestle and mortar are here also necessary to finish the manufacture of the ointment by the solution method.

In the treatment of any disease of the skin, the minutest possible division of any remedy employed in the state of ointment is an advantage which will promptly disclose itself to any one who may choose to experiment on the question; but in the matter of antiseptic applications to wounds, where the aim is to exclude by means of a specially composed ointment the access of infinitesimal germs, such an advantage must perhaps be of still higher value. I have never been able

thoroughly to understand why the British Pharmacopœia orders the crystals of sublimed sulphur to be used for the manufacture of sulphur ointment, in place of the much more minutely divided dust of precipitated sulphur. The former would indeed present to the eye of the *acarus scabiei* (but for the fact that he is destitute of eyes) the appearance of huge rocks of sulphur submerged in a sea of grease, in place of the comparatively muddy appearance of an ointment of precipitated sulphur.

It is true that in former days "precipitated sulphur" used to be largely composed of sulphate of lime, but those days are long since past and the article is now almost universally vended in a pure condition.

One of the best illustrations of my point is afforded by the assistance of the *yellow* oxide of mercury, which in other words is the precipitated as opposed to the coarse or crystalline or so called *red* oxide of mercury.

In pursuance of my preference for the minutely divided conditions of drugs, when used as ointments, I advocated, many years ago, the substitution of the precipitated or yellow oxide for the red oxide in the manufacture of oxide of mercury ointment, not only for cutaneous, but for ophthalmic use, and I read a paper on the subject before the Pharmaceutical Society, on March 8, 1865. The communication, as I admit, attracted no notice whatever in this country, but was copied a month or so afterwards into various French and German periodicals, in which I read an account of it. There equally it attracted no attention except on the part of an oculist, Professor Pagenstecher, of Wiesbaden, lately deceased. He made trial of it and struck with its advantages warmly advocated it, so that about nine months after the reading of my paper the ointment reappeared in this country as Pagenstecher's ointment, under which name it is still known and commonly employed by ophthalmic surgeons.

Mr. White Cooper, in the course of some experiments as to its effect on the diseased conjunctiva, which of course affords a more delicate test of an ointment than almost any condition of the more callous skin, found that in any given case only a much *weaker* ointment of the *precipitated* than of the crystalline (red) oxide could be tolerated. The merit of appreciating this difference so cordially as to enforce incisively a general adoption of the improvement is beyond question due to Professor Pagenstecher, whose energetic habits indeed were the cause of his death; but it is almost to be wished for, that in the compilation of

a work which is so comprehensive, and which necessarily exerts so great an influence on the therapeutics of the day, as the national Pharmacopœia, some larger constituency than two pharmacists supervised by five general physicians should be consulted.

Ointments, although an important item in a pharmacopœia, are in their details somewhat on the outskirts of general medicine; Pagenstecher's ointment, at the least, is not to be found in the British Pharmacopœia. It is used all over the world, but in the Pharmacopœia the red oxide ointment figured still as before nine years after the yellow had come into general preference and stands still so fifteen years after. Some advantage for the future certainly might be gained by the help of those who by cultivating limited departments of medicine have acquired something of a larger acquaintance than is perhaps common of particular classes of remedies; but even waiving that, the absolute exclusion of surgeons, and one may even add of obstetric practitioners, from the legislative parliament of authors of the Pharmacopœia is really quite an anomaly in the present day, as if surgeons were now-a-days armed only with knives, or obstetricians only with forceps and binders. What, it may be asked, do physicians know (officially) of the antiseptic surgical method, or of diseases of the eye, or of stone in the bladder, or of the remedies external or internal for lesions of the ear? At the risk of censure, I will imagine that their knowledge is not quite thorough; but yet the Pharmacopœia is understood on every side to be the most profound attainable exposition of all remedies that can be employed in the relief of bodily distress of any kind.—*Phar. Jour. and Trans.*, October 11, 1884, p. 281.

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**Influence of Salicylic acid on alcoholic fermentation.**—The experiments of G. Heinzelmann (*Bied. Centr.*, 1883, 503) show that the vitality of yeast is completely destroyed by the presence of 0.15 gram of salicylic acid per 400 cc. of sugar solution, whilst the addition of 0.01 per cent. favors its greatest activity, and although the yeast plant does not propagate, nevertheless the cells developed in the presence of salicylic acid are stronger and larger than those produced in a solution free from that acid. Moreover under similar circumstances the production of alcohol in a given time is greater. The addition of 0.1 gram of salicylic acid per litre of "mashing" favors fermentation, especially with pure sugar solutions.—*Jour. Chem. Soc.*

## PRACTICAL NOTES.

BY THE EDITOR.

*An Antiseptic Compound* called *antibacteride* is made by C. Aschmann (*Dingl. polyt. J.*, 251, p. 143) by heating 338 parts borax with 198 glucose, in the presence of a small amount of water. When the fusion is complete, 124 parts boric acid is added, whilst constantly stirring, until dissolved, and the liquor is evaporated at a gentle heat until it solidifies when run on a cold plate. The resulting mass is soft and translucent, forming an antiseptic suitable for the preservation of provisions. Its composition is represented by the formula  $C_6H_{12}O_6, Na_2B_4O_7, 3H_3BO_3$ .—*Jour. Chem. Soc.*

*Use of Boric Acid for Preserving Food.*—From a series of experiments made with a view to determine the action of boric acid on the animal system, J. Forster (*Dingl. polyt. J.*, vol. 251, pp. 170–172) draws the following conclusions: The admission of boric acid as addition to food, even in very small doses, is injurious to the digestive organs. This injurious action depends on the circumstance that boric acid acts so as to materially increase the proportion of solid matters and nitrogen in the fæces separated. It is also a remarkable coincidence that the action of boric acid on the intestinal discharge is well marked, even by the exhibition of as little as 0.5 gram per diem. Moreover, this action is in direct relation to the quantity of acid taken, and is maintained for some time after the doses of acid have ceased. The action described is perceptible, not only with vegetable or animal foods, which contain a large proportion of indigestible ingredients, but also when highly digestible food, such as milk and eggs, is taken. Food to which boric acid has been added tends to cause an increase in the secretion of gall during assimilation. Its most important action, however, is the increase which it causes in the discharge of albuminous substances from the intestinal canal. From this it is evident that its use as a food preservative is not as beneficial as hitherto assumed.—*Jour. Chem. Soc.*

*Belladonine.*—A. Ladenburg and C. F. Roth ascertained (*Ber.*, vol. 17, pp. 152–153) that when this alkaloïd or mixture of alkaloïds is boiled with alkalis, it is decomposed into tropine and an *oxytropine*, which gives a platinochloride,  $(C_8H_{15}NO_2)_2, H_2PtCl_6$ , crystallizing in large red quadratic prisms, readily soluble in water; the acids formed at the same time are tropic acid, and its decomposition-products, atropic and



isotropic acids. It is therefore possible that "belladonine" is a mixture of atropine and oxyatropine,  $C_{17}H_{23}NO_4$ ; further investigations are in progress.—*Jour. Chem. Soc.*

*Detection of picric acid in iodoform.*—Dr. J. Biel reports a sophistication of iodoform with picric acid, for which purpose it is adapted, owing to its yellow color, crystalline structure, melting point, solubility in alcohol and ether, and its cheaper price. On trituration in a mortar it is apt to explode. On agitating iodoform with distilled water and filtering, the filtrate should be colorless, not yellow, and on the addition of solution of potassium cyanide no change should be produced, while in the presence of a trace of picric acid, the liquid acquires within ten minutes a brown red color, due to the formation of isopurpuric acid, and subsequently a brown red precipitate of sparingly soluble potassium isopurpurate.—*Phar. Zeitschr. f. Russl.*, 1884, p. 301.

## VARIETIES.

**NEW ANESTHETIC MIXTURE.**—Dr. Byrd, of Quincy, Ill., recommends a mixture composed of bromide of ethyl, one part (by measure), chloroform, three parts, alcohol, four parts. It must be inhaled together with a considerable quantity of air.—*Med. and Surg. Rep.*

**THE USE OF CHLORAL** as a remedy for obstinate singultus, or hiccough, is recommended by Dr. G. C. Kingsbury. A dose of thirty grains is said to have proved sufficient to stop a persistent hiccough with which the patient had suffered incessantly for twelve days.—*Brit. Med. Jour.*

**SUBNITRATE OF BISMUTH.**—Dr. J. F. Morse regards this salt an excellent surgical dressing, which produces a peculiar change in the difference of the granulations filling a wound, and in the secretions which escape from the wound, providing it be a fresh one.—*Western Lancet.*

**THE COMPATIBILITY OF SULPHATE OF QUININE AND IODIDE OF POTASSIUM.**—It having been suggested that when these drugs are prescribed together, or one a short time after the other, owing to their incompatibility, that they will produce anorexia, nausea, even vomiting, or colic. William Martindale writes to the "*Brit. Med. Jour.*," July 5, 1884, that such a mixture, with the addition of compound powder of tragacanth, is a favorite with a physician in large practice, yet he never heard any complaint about its effect. Chemically, their incompatibility will depend upon whether the normal sulphate of quinine is dissolved by diluted sulphuric acid added to the mixture or not. No decomposition will occur if the two neutral salts be mixed with water in a fairly diluted condition; in an ordinary dose,

some quinine will remain undissolved, as sulphate of quinine. But if diluted sulphuric acid be used to dissolve the sulphate of quinine, the mixture is at first clear; but, on standing, it deposits a reddish-brown powder. Theoretically, this is due to the sulphuric acid reacting on the iodide of potassium, setting free hydriodic acid, which is colorless, but readily decomposes, liberating iodine; and this element, under certain conditions, has a great affinity for sulphate of quinine, forming sulphate of iodo-quinine. The reddish-brown powder which he has mentioned as depositing in the above mixture is not pure sulphate iodo-quinine. It has been analyzed by Righini (*Watt's Dictionary*, vol. v, p. 20), and shown to be a mixture of hydriodate of quinine and iodo-quinine.—*Med. and Surg. Rep.*, Aug. 2.

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## MINUTES OF THE COLLEGE.

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PHILADELPHIA, September 29, 1884.

The semi-annual meeting of the Philadelphia College of Pharmacy was held this day at the hall of the College, No. 145 North Tenth street.

Dillwyn Parrish, President, occupied the chair, and fifteen members were in attendance.

The minutes of the quarterly meeting held in June last were read, and, on motion adopted.

The minutes of the Board of Trustees since that time were read by Wm. C. Bakes, Secretary of the Board, and, on motion, approved.

Alonzo Robbins, Chairman of the Delegation appointed to attend the annual meeting of the American Pharmaceutical Association, made the following report, which was accepted, and ordered to be embodied in the minutes:

### *To the Philadelphia College of Pharmacy:*

The undersigned, Chairman of the Delegation elected to attend the meeting of the American Pharmaceutical Association at Milwaukee, Wisconsin, respectfully reports as follows:

Due, no doubt, to the fact that the place selected was so far from the locality in which the Association has its greatest membership, the meeting was not as largely attended as usual.

The sessions were held in Turner Hall, which was well adapted for the purpose, except that some annoyance was unavoidably caused by the exhibition being in a room immediately over the meeting room.

Over twenty original papers were read, most of them being quite interesting, and, perhaps, a larger proportion than usual showing evidence of careful investigation, and giving promise of much practical and scientific value. In this connection it may be well to state that, owing to the increasing difficulty of getting members to accept queries, it is very desirable that the various State Pharmaceutical Associations should, in some way, become contributors to this important work of the National Association.

It is a source of regret that in the matter of an increase of membership this meeting was not a success, there being only about forty new members

obtained, while nearly eighty are liable to be dropped from the roll. Considering the evident prosperity of pharmacists in the Northwestern States, it is surprising that so few could be induced to join the Association.

Mr. John Ingalls, of Macon, Ga., was elected President for the ensuing year. Pittsburgh, Pa., and the second Tuesday of September, 1885, were selected as the place and time for holding the next annual meeting.

Previous to the meeting of the American Pharmaceutical Association, the annual meeting of the National Retail Druggists' Association was held. The great interest manifested in this meeting no doubt contributed to draw many to Milwaukee who otherwise would not have attended. This Association, organized only a year ago, now numbers over 2,500 members.

The evenings during our stay in Milwaukee were devoted to various pleasant social entertainments; one afternoon was given to a carriage ride around the city, and on Friday afternoon a very pleasant excursion on Lake Michigan took place.

During Friday afternoon and evening quite a large party started for Kilbourn City, from which place a trip was made by steamboat up the Wisconsin river through the Dells, returning to Kilbourn by row-boats. The Dells, or as originally termed, the Dalles of the Wisconsin river, extend from about four miles above, to about two miles below Kilbourn City, and consist of a deep passage cut by the river through the soft sand-rock, with numerous openings called gulches, canyons, etc., some of which extend a mile or two back from the stream.

From Kilbourn a number started homeward, but the majority of the party continued on to Minneapolis and St. Paul.

Respectfully submitted,

September 29, 1884.

ALONZO ROBBINS, *Chairman.*

Professor Remington, on behalf of the Committee on Deceased Members, alluded to the death of our fellow member, Ambrose Smith, but stated that in consequence of the shortness of time since his death, the Committee had not been able to get the important facts concerning his life together for a memorial notice. He hoped, however, that the Committee would be able to make a report at the next stated meeting of the College.

Charles Bullock, alluded to the deceased in fitting terms, and spoke of his usefulness in the College for many years; acting as Treasurer, and otherwise serving its interests.

The President ordered an election for three Trustees, and a Committee on Deceased Members, this being the time for such action, and appointed Messrs. Evan T. Ellis and Edward C. Jones tellers, who, upon a ballot, reported the following gentlemen elected:

*Trustees for three years, term ending September, 1887.*—Messrs. Albert P. Brown, William B. Thompson, Henry Trimble.

*Committee on Deceased Members.*—Messrs. Charles Bullock, Alfred B. Taylor, Gustavus Pile.

Then, on motion, adjourned.

WILLIAM J. JENKS, *Secretary.*

## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, October 21, 1884.

The first of the series of Pharmaceutical meetings of this season was held this day.

Mr. Alonzo Robbins was called to preside.

Dr. A. W. Miller presented to the College, on behalf of Mr. Alfred Speer, specimens of American wines made at Passaic Falls, N. J., by the donor, who claims absolute purity for them; also specimens of Dundas Dick & Co.'s Menthol cones.

Professor Maisch presented Vol. V of the Index Catalogue of the Library of the Surgeon General's Office; also from Prof. Herrera a copy of *Nueva Farmacopea Mexicana de la Sociedad Farmaceutica de Mexico*, segunda edicion; also on behalf of Dr. F. L. Slocum, a copy of Dr. D. Gorter's work on *Materies Medicæ*, published in 1740; a copy of the *Code pharmaceutique*, à l'usage des hospices civils, etc., par A. A. Parmentier, published in 1803, and one of the *Pharmacopœa Pauperum in usum instituti clinici Hamburgensis*, published in 1804; also a copy of Bloxam's Chemistry, one of Wurtz's Elements of Chemistry, and one of Lloyd's Chemistry of Medicines, and a reprint of the first *Pharmacopœia* published in the United States, the latter from the publishing committee; also Proceedings of the American Pharmaceutical Association, 1883. Four volumes of the Patent Office Reports and a copy of the Report of Herndon and Gibbon's Exploration of the Valley of the Amazon, made by order of Congress in the years 1852-'53, were received from the Actuary, and the thanks of the meeting were returned to the various donors.

A specimen of Virgin Scammony was received from Mr. Henry N. Ritzenhouse, by whom it had been imported.

Mr. C. Fred Zeller, the Curator of the Cabinet, presented a specimen of the flowers from which Dalmatian insect powder is obtained; this specimen of *Pyrethrum cinerariæfolium* was grown in California.

Dr. L. Wolff read a paper upon the propriety of the apothecary preparing his own fluid and solid extracts and showed two forms of apparatus for the recovery of the alcohol or other volatile liquids which might be used in such preparations; the paper was referred to the Publication Committee. Professor Maisch expressed the opinion that papers of this kind were very important, and should induce the apothecaries to prepare their own pharmaceuticals and very many of their chemicals, as they were educating themselves and their apprentices as well as offering medicinal agents the qualities of which they were sure were of the proper standard.

Dr. Wolff inquired if any of the members present had any experience with the alkaloid obtained from *Erythroxylon Coca*, which has been recommended lately as an anaesthetic in ophthalmic practice. Professor Maisch stated that he had experimented somewhat with Coca in 1861, isolated the cocaine and determined the existence of a second alkaloid which had since



been more fully investigated; since that time he had not experimented with the alkaloids.

It was queried whether the use of *chloral hydrate* was incompatible with *calomel*. Dr. Wolff thought that there was no apparent reason for considering the two chemicals as being incompatible. Professor Maisch concurred in this, but suggested that as chloral hydrate was so readily decomposed under various circumstances, the chlorinated decomposition products might determine the formation of some soluble compound of mercury, possibly corrosive sublimate; the subject was deserving of investigation.

There being no further business, a motion to adjourn was carried.

T. S. WIEGAND, *Registrar*.

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## ALUMNI ASSOCIATION, PHILADELPHIA COLLEGE OF PHARMACY.

The first social meeting, held October 14, was well attended, L. E. Sayre, Ph.G., occupying the chair. Dr. Carl Seiler gave an interesting and instructive lecture on "Hay Fever and its Treatment," illustrating his remarks by diagrams, models and apparatus, among the latter being one used for the destruction of what the lecturer termed the "hay fever spots" by means of a platinum wire heated with a galvanic battery. The palliative effect of the Turkish bath was likewise explained.

Dr. Miller stated that a nostrum sold as a catarrh cure consisted almost wholly of sodium bicarbonate.

The remaining time was occupied with recitations by Miss F. L. Pierce, principal of the Mount Vernon Institute of Elocution, and Miss L. Lorenz, with the reading of reports, examination of specimens and discussions.

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## EDITORIAL DEPARTMENT.

HOMES FOR COLLEGES OF PHARMACY.—We are pleased to note the fact that to those colleges which have heretofore secured buildings for their sole use, two have been added during the past month, those of St. Louis and Chicago. The new buildings, we understand, are well supplied with lecture rooms, laboratories and other conveniences. The faculty of the St. Louis College remains unchanged; the Chicago College has secured the efficient services of Professor Oscar Oldberg, who in addition to his lectures, has also the laboratory work in charge.

While it is gratifying to observe the steady progress made in pharmaceutical education in this country, it is to be hoped that in the near future also those institutions may secure permanent homes of their own, who as yet have not procured them.

## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

*The National Dispensatory Containing the Natural History, Chemistry, Pharmacy, Action and Uses of Medicines, etc.* By Alfred Stillé, M.D., LL. D., and John M. Maisch, Phar.D. Third edition, thoroughly revised, with numerous additions. With 311 illustrations. Philadelphia: Henry C. Lea's Son & Co., 1884. Large 8vo, pp. 1755. Price in cloth, \$7.25; in leather, \$8.00.

The authors have endeavored to make this third edition of the National Dispensatory complete, interesting and instructive; the book is the very Encyclopædia of Pharmacy and nothing has been left undone to reach this end. The origin of drugs, their nature, properties, constituents and composition are fully described, their adulterations and impurities are mentioned, and their physiological effect based on experiments with animals, and therapeutical effect as elicited by clinical experience are explained. Their administration in Pharmacy and Medicine, with the doses, are minutely given.

Besides the new drugs and new officinal preparations of the Pharmacopœia of 1880, a great many, as yet unofficial, have been added. While in the former editions, besides the U. S. preparations, mainly those of the British Pharmacopœia were mentioned, this edition contains also the compounds and preparations of the latest German Pharmacopœia and a great many of the French Codex, thus giving the book the character of a pharmaceutical Dictionary.

The arrangement is in the main part the same as in the former editions. All the new drugs and preparations taken up in the Pharmacopœia of 1880 are conspicuously inserted, carefully described and commented. To conform with the requirements of the Pharmacopœia several changes had to be made, particularly in the nomenclature and in the headings of different articles. So we find *Filix mas* under *Aspidium*, *Gamboge* under *Cambogia*; *Spir. Lavandule comp.* is called *Tinet. Lav. comp.*, and *Pilule ferri carbonatis* and *Pil. Hydrargyri* are mentioned under *Massa ferri carb.* and *Massa hydrargyri*. Some of the headings of drugs are more condensed: *Chrysophanic acid* and *Araroba* are to be found under *Chrysarobin*, the former also under *Rheum*; older inmates of *Materia Medica* from the mineral and animal kingdom, whose chief constituent is Carbonate of Calcium, as *Corallia*, *Testæ ovorum* and *Conchæ præparatæ* are enumerated under *Creta præparata*, and the different Starches and Arrowroots are all found under the heading of *Amylum*, where the granules of each kind are illustrated. Many more of such instances could be mentioned, but suffice it to say that we consider these condensations as very instructive and beneficial to the student of Pharmacy, inasmuch as he becomes better impressed with the relation of the different substances. The General Index is so complete that everything is easily found in the book.

Some of the preparations and salts which have in later years become of more importance in Medicine are made more conspicuous under separate headings, while others, and also numerous raw drugs, are enumerated under "Allied Drugs and Preparations," which are made conspicuous by smaller type and closer printing.

Illustrations are given of the forms of crystals of the more important

Salts, and numerous wood-cuts are added of the anatomical structure of different barks and roots.

Of the many additions of unofficinal drugs and preparations we mention particularly Thymol, Resorcin, Kairine, Quebracho and sundry Cadmium and Nickel Salts.

To facilitate the use of the formulas of the Pharmacopœia, which are expressed therein in parts by weight, they are also given in definite weights and measures.

As Commentary of the Pharmacopœia this edition is of superior value. Under the heading "Extracta and Extracta fluida" the process for preparing these important preparations in pharmacy is minutely described and the process as practiced in other countries, critically commented; for the preparation of fluid extracts by means of percolation directions are given for the manipulation of each part of the operation and every particular so lucidly explained that every pharmacist by carefully observing the instructions, must be able to make these so very important preparations himself.

As the revisers of the Pharmacopœia did not see fit to give in the Pharmacopœia formulas for preparing certain chemicals, formulas for preparing these are also left out in this edition; the authors made up this deficiency by explaining the process by which this or that article is obtained. This is certainly much better and more instructive as pharmacists will hardly ever undertake to make Quinine or Strychnine, Corrosive Sublimate or other such chemicals.

The articles on Cinchona and Opium and their products comprise everything that investigation and science have elucidated up to the present time, not only in regard to pharmacy but also to therapeutics.

Of great importance are the tests and assays for ascertaining the purity, strength and relative value of a great many substances.

Under tests we not only understand the physical properties which characterize the pure substance but also the chemical relation to other substances. The tests mentioned in the book to prove the identity of the substance and also to give the absence of any impurities are selected with great care and conform to the latest researches in chemistry and pharmacy. Tests of the British and German Pharmacopœias are mentioned for comparison.

The assays given under Cinchona, Opium and other valuable drugs, to ascertain their true value are of great importance, and every conscientious pharmacist ought to find delight in making use of them for his own satisfaction.

The list of volumetric solutions, as adopted by the Pharmacopœias, for ascertaining the purity of certain chemicals and the relative strength of others, must not be undervalued.

The paragraphs on the physiological action and medical uses of Drugs and Medicines we found largely augmented, particularly so with Carbolic acid, Salicylic acid, Jaborandi and others, and those substances which in later years have been recommended and experimented with for anæsthetic effects are very exhaustively treated upon.

The largely increased Index of Therapeutics is a further proof of the care which the authors have bestowed on this third edition.

The typography of the work leaves nothing to be desired. \*



The authors certainly deserve the fullest acknowledgments for their arduous labors and are entitled to the sincere thanks of the pharmaceutical and medical professions.

E. SCHEFFER.

LOUISVILLE, September, 1884.

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*Materia Medica and Therapeutics*, an introduction to the rational treatment of disease. By J. Mitchell Bruce, M. A., M. D., etc. Philadelphia: Henry C. Lea's Son & Co. 1884. 12mo., pp. 547.

The scope of this work is therapeutical as indicated by the title. In the introduction the various pharmaceutical preparations and processes are briefly defined and explained; also the art of prescribing and the administration of drugs. The *materia medica* is divided into two parts, entitled inorganic and organic *materia medica*. These titles are not entirely correct, inasmuch as the first part contains not only the inorganic compounds of the metallic and non-metallic elements, but also a number of carbon compounds, which are usually denominated organic. This group is termed the "carbohydrates and other carbon compounds," though not a single carbohydrate is here considered, although their derivatives like alcohol, etc., have found a place under this heading. Nitrous oxide has been placed in this group (p. 153) for no other obvious reason, except that it is conveniently considered with ether and the various chlorine and bromine compounds possessing anæsthetic properties. On the other hand a number of definite chemical compounds like tannin, gallic acid, *santonin* and the vegetable alkaloids are treated of in connection with the drugs from which they are usually prepared; this is likewise the case with such products like fats, volatile oils, resins, and the carbohydrates gum, starch, sugar and milk-sugar.

The organic *materia medica* is divided into two groups according to the origin of the drugs from plants or animals, both groups being arranged according to the natural system. The drugs comprise those of the British Pharmacopœia, together with a number of more or less important ones, which are not recognized by this authority, a number of the latter being of American origin. A few of the vegetable drugs have been assigned a wrong position, like *Podophyllum* (p. 178) which has been placed among the *Ranunculaceæ*, while botanists now refer it to the *Berberidaceæ*; and *Cimicifuga* (p. 179) which has been referred to the *Magnoliaceæ*, but properly belongs to the *Ranunculaceæ*. The drugs are briefly defined according to the botanical name, part and habitat of the plant; a brief description, the composition and dose are given, and then in accordance with the plan of the work, more in detail, their action and uses. The descriptions are usually those given by the British Pharmacopœia; unofficial drugs are described in a similar brief, but generally more vague manner, the description being, in some cases, positively wrong. Thus *Spigelia* is said to be "a thick globular brown head, with numerous fine branching rootlets" (p. 291). In some cases the terminology is wrong or at least inconsistent; thus *duboisia* (p. 307) is defined to be an alkaloid from *Duboisia myoporoides*, but on p. 388 it is given as the plant; leaves would be better. Similar



errors have crept into the tables on pages 386 and 387, where the different drugs are enumerated according to the parts of plants they represent. Kamala is said to be the fruit and the berry; Dulcamara the whole plant and the tops; Meatha piperita and *M. viridis* the flowers or buds, etc., and a distinction between fats and volatile oils is not made.

We have chiefly dwelt upon the descriptive portion of materia medica, which though in the main correct, is in need of careful revision. That portion referring to therapeutics, we believe to be free from inconsistencies, but we must leave this to the judgment of physicians. The third part of the book on general therapeutics comprises about 150 pages and discusses the action and uses of remedies under the headings of the physiological systems of the body, like digestion, circulation, respiration, etc. The compactness of the work and its fulness we think, will render it valuable to the medical student.

*American Medicinal Plants*; an illustrated and descriptive guide to the American plants used as homœopathic remedies, their history, preparation, chemistry and physiological effects. By Charles F. Millsbaugh, M.D. New York and Philadelphia: Boericke & Tafel. No. 1-5. Price, \$5.

The first part of this work was issued in 1882; but the publishers have deemed it better to issue it in fascicles of five parts, containing 30 plates, with the necessary text. We have commented on the first part in this JOURNAL, 1882, p. 478, and are pleased to say that the improvements which we then considered necessary have been made, so that now it merely remains to state that two such fascicles will be published each year, and that probably within two years the work containing 100 illustrations, will be completed. To judge from the present fascicle the work will not be confined to plants indigenous to North America, but will also contain those which have become naturalized like *Berberis vulgaris*, *Melilotus officinalis*, *Chelidonium majus* and others.

*The Elements of Physiological and Pathological Chemistry*. A hand-book for medical students and practitioners; containing a general account of nutrition, foods and digestion, and the chemistry of the tissues, organs, secretions and excretions of the body in health and in disease; together with the methods for preparing or separating their chief constituents as also for their examination in detail, and an outline syllabus of a practical course of instruction for students. By T. Cranstoun Charles, M.D., F.C.S., etc. Illustrated with 38 engravings on wood and a chromo lithograph. Philadelphia: Henry C. Lea's Son & Co., 1884. Svo. pp. 463. Price \$3.50.

With the exception of urinalysis, this branch of applied chemistry is not nearly as extensively cultivated as its importance requires, and even the special application referred to is frequently resorted to merely for the purpose of determining qualitatively the presence or absence of one or two normal or morbid constituents. With the extension of the field of chemistry to the continuously occurring changes within the living body, and with the improvements in methods and apparatus suggested by close observation of apparently insignificant distinctions in the properties of products, the number of distinct principles, wholly or partly isolated from vegetable

and animal bodies, has been materially augmented of late years, and greater precision has been secured for distinguishing them. In order to study these intelligently the student should possess a thorough knowledge of the elements of general chemistry, and practical acquaintance with analytical work. Thus prepared he will be enabled to profitably pursue the course of experimental work which the author has mapped out in the book with continual references to the subject matter treated of elsewhere.

The work is divided into four parts, the first treating of nutrition and foods. It opens with brief descriptions of apparatus, reagents and processes, and then considers nutrition and the various classes of foods. The second part is devoted to digestion and the secretions concerned therein, comprising the saliva, gastric, pancreatic and intestinal juices and bile. The third part discusses the tissues and remaining secretions, including blood and its constituents with derivatives, milk, the various organs, etc.; and the fourth part relates to the excreta, feces and urine, the latter being treated with considerable detail, on account of its importance from a physiological and pathological point of view; about one fourth of the book is devoted to the normal and abnormal constituents of urine and to its analysis.

In the foregoing we have given merely the roughest outline of the contents of the work. We cannot enter into details, and merely state here that the descriptions are clear and the leading characters judiciously put forth. Everywhere the evidence is apparent that the author not only knows what he is writing about, but also has consulted the literature of the subjects. Primarily intended for the use of the medical student and the physician, the work is nevertheless almost entirely an important one for the progressive pharmacist, who is acquainted with or desires further information on the analysis of urine, calculi, milk, blood and other animal substances. The illustrations of apparatus, crystalline deposits and of microscopical drawings are good, and the plate giving the absorption spectra of six derivatives of blood has been handsomely executed.

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*Manual of Chemistry.* A guide to lectures and laboratory work for beginners in chemistry; a text-book, specially adapted for students of pharmacy and medicine. By W. Simon, Ph.D., M.D., Professor of Chemistry and Toxicology in the College of Physicians and Surgeons, and Professor of Chemistry and Analytical Chemistry in the Maryland College of Pharmacy, Baltimore. With 16 illustrations on wood and 7 colored plates. Philadelphia: Henry C. Lea's Son & Co. 1884. Svo, pp. 411.

Elementary works on chemistry are so numerous that a new one would seem to be superfluous; but the one now before us has been written with such good judgment of the needs of those for whom it is intended, that it will be appreciated. Being intended merely for a guide to learners, not as a work of reference, many details have purposely been omitted which would be looked for in larger works. A frame-work is thus presented which gives the fundamental principles and characters of chemistry and chemical compounds, and thus aids the attentive student in completing the structure. That the want of pharmaceutical and medical students has

been specially considered is also evidenced by restricting the consideration of the elements and their compounds to those which are of medicinal use, or which are of importance, theoretically or practically, in the various chemical processes or as constituents of important products of nature. At the same time the work is comprehensive and embraces nearly the whole field of chemistry in its application to pharmacy and medicine.

The work is divided into seven parts, treating of chemical physics, principles of chemistry, non-metals, metals, qualitative analysis, carbon-compounds and physiological chemistry, the latter including the testing of milk, urine, etc. A welcome feature for the beginner are the 56 illustrations upon seven plates, showing the exact color or change of colors of characteristic chemical reactions; they have been very faithfully executed, and represent a very large amount of well directed labor.

Also in all other respects the book is not only presentable, but good, and will be found useful and instructive.

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*Addenda to Drugs and Medicines of North America.* By J. U. and C. G. Lloyd. Cincinnati.

The quarterly publication by the same authors which we have noticed on page 346 of the June number of the JOURNAL, and of which now three parts have appeared, not only continues in the path lined out for it in the first part, but the following ones have been made even more interesting and valuable by the histological descriptions and the maps showing the distribution of the plants under consideration. The periodical now before us, is intended to supplement the former, by noting information which may have come to light after publication in the first periodical, and to collate notes on the medical properties of American plants in local use. The "Addenda" will be issued at least four times a year, at the low price of 25 cents.

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*The Physician's Visiting List for 1885.* Philadelphia: P. Blakiston, Son & Co.

This is the thirty-fourth year of the publication of this visiting list, which may be obtained arranged for from 25 to 100 patients weekly, the larger ones bound either in one or two volumes. Interleaved lists are likewise furnished.

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*Sur la recherche de très petites quantités de sucre dans l'urine.* Par le Dr. C. Méhu, pharmacien à l'hôpital de la charité.

On the detection of very small quantities of sugar in urine.

Reprint from "Annales des maladies des organes génito-urinaires," August, 1884.

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*Pharmaceutical Education in the United States.* By Prof. Oscar Oldberg, Chicago, Ill.

A fair exposition of the educational courses adopted by Colleges of Pharmacy, with suggestions by the author.



# THE AMERICAN JOURNAL OF PHARMACY.

DECEMBER, 1884.

## THE PREPARATION AND THERAPEUTICS OF HYDROCHLORATE OF COCAINE.

BY L. E. SAYRE, PH.G.

Recent developments connected with this comparatively new salt have excited much interest in the medical profession. Its peculiar property—one for many years sought after, yet until recently almost unknown—has been at length found to exist in this alkaloid obtained from *Erythroxylon Coca*, namely, that of producing local anæsthesia. By its use the surgeon can, without pain or discomfort to the patient, perform an operation which must otherwise cause great agony. It is said, however, that, while there is produced an insensibility to suffering, the sensibility to touch, in the same part, still remains.

That such a property should be discovered in a substance so apparently innocent, seems truly worthy to be considered a triumph in the chemistry and therapy of the present day.

The formula for its preparation, as given to me by Mr. M. Eisner, which is substantially that of Niemann (see "*Amer. Jour. Phar.*," 1861, p. 123), is as follows: Displace coca leaves with dilute alcohol and a small quantity of sulphuric acid. Add calcium hydrate to the percolate, neutralize with sulphuric acid, distill off the alcohol. Dissolve the residue in water, and filter; add soda bicarbonate to the filtered liquid, and wash with ether, adding a small quantity of muriatic acid. The ethereal solution will deposit the hydrochlorate of cocaine in an amorphous mass, gradually crystallizing. Purify by dissolving in water, precipitating with soda bicarbonate and washing with ether, and leave it to crystallize out of the ethereal solution.

Local narcotization was practiced long ago, of which a number of instances might be cited, but the scope of this article will admit of only a few.

Bouisson used a plaster of opium to the toe of a patient for some time, and afterwards succeeded in partially tearing away the nail without causing pain. He used belladonna ointments to relieve the pain



of operation upon *fistula in ano*. Plans have been in vogue for smearing bougies, catheters, etc., with narcotic ointments while dilating, cauterizing or incising urethral strictures.

B. W. Richardson (1866) used the atomizer for rendering parts insensible, the most volatile liquids producing the best results.

H. J. Bigelow recommended the use of rhigolene spray. By these means the part to which the application was made was temporarily frozen, and thus the sensibility was almost entirely destroyed. Freezing mixtures of salt and ice were long formerly used for this purpose.

Von Anrep, the first one to apply cocaine to the eye, in 1880, used a solution containing  $\frac{1}{2}$  milligram to the conjunctiva. He noticed it caused temporary dilatation of the pupil, but took no note of the temporary insensibility produced.

Dr. Isaac Ott experimented, in 1876, internally, and noticed resulting pupillary dilatation.

In order to obtain reliable information concerning this new agent, the writer has interviewed some of the leading oculists of this city, and obtained from them their experience and opinions in regard to it.

Peter D. Keyser, M. D., Professor of Ophthalmology in the Medico-Chirurgical College, and one of the Surgeons to Wills Eye Hospital, stated that his experience had been with varied operations, and that he finds it to be, as a local anæsthetic, "one of the grandest things discovered, but it does not seem to pass deeply into the tissues." In cases of strabismus there was not the least pain in grasping and cutting the conjunctiva, nor until the hook was passed under the muscle and its tendonous attachment cut.

This part of the operation was very painful. In cases of discision for soft cataract, and in removing a cretaceous capsule, it acted charmingly, but when the iris was grasped and cut there was the usual pain. In the removal of foreign bodies upon the cornea, it comes splendidly into place. The proper way of instilling it, is to run a drop over the cornea, every minute, of the 4 per cent. solution, for 3 or 4 minutes, and then go ahead with the operation, for by that time the complete anæsthetic influence is attained. If the operation is a little long, the instillation is continued every few minutes during the whole time. Its influence passes off in about 10 to 15 minutes. As a whole, it is one of the most advantageous substances that has yet come into use for the purpose intended, as it will save the trouble of etherizing in many cases, and be the cause of saving time in operations as well as

relieving pain in many little cases almost too light to chloroform or etherize for. With inflamed or congested eyes, more frequent instillation and longer time are required to obtain the effect.

Hypodermic injection under the conjunctiva caused its anæsthetic action deeper, and relieved pain in tenotomy in strabismus operations.

The 4 per cent. solution is preferable to the weaker ones, the latter requiring longer time in proportion to their strength.

Dr. Henry S. Schell, of Wills Eye Hospital, gives me his experience, as follows:

"1. The most favorable class of cases for the use of the drug is that where a foreign body is embedded in the cornea. These cases are very numerous, are accompanied by much pain and are often difficult to deal with, especially in children, on account of the inability of the patient to control the movements of the eye when it is approached with a spud for the purpose of removing the offending particle. As a general rule, however, in 5 minutes after the instillation of 4 drops of a 2 per cent. solution of cocaine into the conjunctival sac pain is gone, and the cornea is insensitive, so that the foreign body can be picked out with deliberation and accuracy. But this happy result is not invariable. In many cases several repetitions of the instillation, at intervals of 3 minutes, will be necessary before the requisite insensibility can be obtained, and in some instances the patients have asserted that the drug had no effect whatever.

"The best way to apply the solution is to insert the drops into the outer angle of the eye, the patient being in a recumbent position, or with the head thrown well back, and then to retract the eyelids so that the fluid can find free access to all parts of the conjunctival sac.

"The action of the drug is accompanied by a blanching of the surface vessels, as well as dilatation of the pupil and paresis of the accommodation. The progress of the anæsthesia may be measured by occasionally touching or scraping the conjunctiva with the point of a needle.

"2. In strabismus and cataract operations, in iridectomies, etc., it will be found necessary to use the cocaine solution more freely and of greater strength. Two drops of a 5 per cent. solution may be instilled every 3 minutes. After from four to eight such applications the operation may be performed. It has not yet been my good fortune to see any case where the free use of the strabismus hook, or the cutting of muscle, was unattended with pain. I have been told of a case where

enucleation of the eyeball has been performed without discomfort to the patient, by the liberal use of cocaine. This is to me very surprising."

"3. In painful diseases of the cornea this drug is of much benefit. It is especially useful in phlyctenular keratitis with great photophobia. The attendant blepharospasm is completely relieved, and the child's eyes may be examined without its screaming or struggling. In the severe cases of irido keratitis, of constitutional origin, cocaine will relieve the intense photophobia after all other measures have failed. I have not observed, however, that the drug has any curative effect upon the morbid processes."

The following observations and conclusions are quoted in full from a communication to me under date of November 12th, from Dr. Charles A. Oliver, one of the Ophthalmic and Aural Surgeons to St. Mary's Hospital, of this city, who for some time has been making personal use of the drug, besides having access to the current literature upon the subject. He therein furnishes me with a few data of its use and value in ophthalmic practice, which he has kindly tabulated in a series of definite observations and conclusions:

"With varying quantities of three to eight drops of a two per cent. solution instilled into healthy eyes twice or three times, at five minute intervals, the following observations were made:

"1. Almost *ad maximum* pupillary dilatations occurred in forty-five minutes to an hour, the pupil returning to normal size in four to six hours. This length of time could not be considered as normal, as it merely represents the individual muscular *tonus* and amount of endosmosis.

"2. During the time of dilatation, the pupillary rim of the iris assumed various irregularities in outline of the same character as may be seen in the action of Duboisia and Homatropine upon the iris.

"3. At the time of instillation, no more local inconvenience or pain was complained of than during the use of the solution of the neutral salts of the other mydriatics.

"4. In some instances, in a few moments following the use of the drug, there was a complaint of a saltish taste, which quickly passed away.

"5. In no instance was there the least constitutional manifestation of the drug.

"6. In every case, accommodative range was lessened, but to what



extent, no accurate determination had been made. This came on during the pupillary dilatation, and fully returned in several hours' time.

"7. In each case, there was both local analgesia and anæsthesia. Sensation of pain was lost wherever the drug had touched, and sensibility was deadened in localized areas. These evidenced by the pinching of the conjunctiva with forceps without causing any pain; whilst in some places the grasp was not felt at all, that is, when care was taken not to exert a dragging over a large area of conjunctiva.

"Conclusions:

"First. Upon account of the evanescence of pupillary dilatation and the quick return of ciliary power, the drug will be of great value in making ophthalmoscopic examinations in cases dependent upon their use.

"Second. It will be useful in cases where it is desired to introduce instruments of holding or fixation beneath the lids. Lachrymal probes coated with ointments containing the drug may be of advantage in lessening the sensibility of the passages during the maintenance of the probe in position. In fact, it may be used where any instrument of precision or of treatment is apt to cause error, inconvenience or harm by pain or sensibility.

"Third. It may be of value in annulling the pain from applications of cauterizing agents, strong astringents, etc., although it is to be remembered that the tissues may be rendered momentarily abnormal by the anæsthetic to such an extent as to prevent proper actions of the astringent or cauterizing material.

"Fourth. In diseases or injuries of the external eye, where nerves are exposed or irritated, it may be employed with much soothing benefit. Thus, in scratches of the corneal epithelium or of the conjunctiva, in superficial ulcerations or nerve irritations, it may be of inestimable good.

"Fifth. It may be of value in various surgical operations upon those parts of the eye which can be readily reached by the drug, such as the extraction of foreign bodies from the cornea and conjunctiva, slitting of canaliculi, extirpation of corneal or conjunctival tumors, etc.

"Sixth. It may be of service as a local hæmastatic in cases of operation where it is desired to follow the steps of the procedure without obstruction from clots and masses of blood, or as a remedial agent in arresting hæmorrhage from trauma or disease.

"Seventh. Judging from its action upon the iris and ciliary muscle,



it may be of some importance in operations upon these structures in lessening pain and checking hæmorrhage.

"Eighth. By its use in ophthalmic surgery all of the petty annoyances from general anæsthesia may be done away with.

"Ninth. In view of the powerful effect of the drug upon the eye, more data are necessary before it can be *universally* employed as a local anæsthetic in eye-surgery."

## SYRUP OF DENTITION.

BY W. B. THOMPSON.

A compound, with the above as a title, is being ordered of the apothecaries of this city, by prescription, ordering by title alone, generally finds the dispenser unfamiliar with this class of preparations. In the absence of other accessible means it is, of course, only by application to the prescriber or to some druggist who may happen to possess it, that the dispenser can procure the formula. It is proper that as soon as such recipes come into vogue or use they should become, through publication, common property, to the end that all may have equal opportunity.

The writer, on procuring the formula, and being under the impression that it was original in the French Codex, applied to Professor Maisch, who, after examination, very kindly gave the following information :

Dorvault's l'Officine (but not the French Codex) contains the recipe under the name of 'Sirop de Dentition de Delabarre,' with a formula very similar to that you gave me, as follows :

R. Juice of fresh tamarinds.....	3 gm.
Infusion of saffron (strength 3 per cent.)..	2 "
Purified honey.....	10 "
Tincture of vanilla.....	25 "

Dorvault says, in a note appended, "The juice of tamarinds may be replaced by the pulp diffused in water" (proportions not given), the fresh juice, of course, not being obtainable.

There being, as will be observed, considerable obscurity in regard to proportion of ingredients in the components of the above, something will have to be assumed by individual judgment in working out an acceptable and nice compound. The preparation will be assigned,

naturally, a place among the fanciful, but will attract the attention of the younger members of the medical fraternity by its novelty. The elders, we imagine, will want it but seldom, unless it can be demonstrated that it has something of utility in it. As a placebo it may divert the infant by sweetening the coming tooth, but that it will assuage or mitigate the pain of that sometimes painful process, dentition (if that be the purpose and intention of the preparation), readers will pardon the writer for doubting.

PHILADELPHIA, November 15, 1884.

## SODIUM BOROBENZOATE.

BY THOS. S. WIEGAND, PH.G.

Having had occasional prescriptions for borobenzoate of sodium, and being unable to find a formula in the commoner treatises on chemistry, I obtained the following formulas from friends who had used them, and offer them for publication.

For making the salt (said to be taken from "Johnson's Medical Formulary"):

Take of Borate of sodium.....	3 oz.
Benzoate of sodium.....	4 oz.
Water, sufficient to dissolve.	

Make a solution of the salts in the water, and evaporate, with constant stirring, to dryness. One-sixth of these proportions yields an ounce.

Or,

To a hot solution of borax add benzoic acid sufficient to saturate it, and evaporate to dryness.

The latter formula would seem preferable. The salt is prescribed in 12- or 15-grain doses, given with tonics.

The following prescription has been used by Dr. D. H. Agnew, of this city, and evidently contains the same salt, although made extemporaneously:

R	Sodii biberatis.....	ʒii
	Acidi benzoici.....	ʒiss
	Spir. juniperi.....	
	Syr. hypophosphitum .....	aa fʒii

M.

Sig. A tablespoonful 3 times daily.

## LABORATORY NOTES.

*Abstracts from Theses.*

*Fluid Extract of Convallaria Majalis.*—The most satisfactory results, according to Wm. E. Cassell, are obtained by using for 16 troyounces of the drug a menstruum composed of 3 fluidounces of glycerin, 5 fluidounces of water, and 8 fluidounces of alcohol, and exhausting finally with diluted alcohol. Fourteen fluidounces of the percolate are reserved, and the remainder is mixed with 1 fluidounce of glycerin, evaporated to two fluid ounces and mixed with the reserved portion.

*Verbena hastata.*—Alexander A. Weber has found the blue vervain to be an excellent sudorific. The root, leaves and flowers are used, but the root, which has a bitter, astringent and nauseous taste, is the most active. The *fluid extract* is a convenient preparation and is made with diluted alcohol in the usual manner; the dose of it is one-half to one fluidrachm.

*Iris versicolor.*—The oleoresin prepared by Wm. L. Cliffe, yielded to acidulated water a brownish amorphous substance, which, after the separation of the acid, was soluble in ether, alcohol and water, the latter solution giving precipitates with potassio mercuric iodide and with potassium biniodide, while the alcoholic solution, acidulated with nitric acid and tested with phosphomolybdic acid gave a brilliant green color in a day or two. The drug after treatment with benzin, yielded to 80 per cent. alcohol several resins, tannin and sugar. Cold water now took up albumen, and gummy and coloring matter, after which treatment with boiling water yielded a slightly colored liquid which did not become blue with iodine. The distillate with water separated a solid compound which became liquid at the temperature of the body. (See also "Amer. Jour. Phar.," 1876, p. 406, and 1881, p. 601.)

*Teucrium Scordium* has been used with advantage in hemorrhoids both locally and internally. Louis Murjahn has prepared a *fluid extract*, by exhausting the powdered herb with diluted alcohol in the usual manner; it is of a blackish green color and is given in doses of 1 or 2 fluidrachms. On evaporating this liquid, about 16 per cent. of a soft dark green *extract* is obtained, which has been used in the form of pills, one grain of it being combined with two grains of the powdered herb. For local use the *ointment* was prepared by mixing 1 part of the finely powdered herb with 9 parts of petrolatum.

*Syrupus calcii lactophosphatis.*—Geo. Thos. Williams has found the

formula of Mr. Rother ("Am. Jour. Phar.," 1883, p. 610) to yield a more stable preparation than that of the U. S. Pharmacopœia, and suggests a few slight modifications so as to make the preparation correspond to the official.

Take of Precipitated calcium carbonate.....	13 parts
Lactic acid.....	33 "
Phosphoric acid, U. S. P.....	18 "
Orange-flower water.....	80 "
Sugar in coarse powder.....	600 "
Distilled water sufficient to make.....	1000 "

Mix the lactic acid with 136 parts of distilled water and gradually add the calcium carbonate, warming gently, if necessary. Add the phosphoric acid previously diluted with 120 parts of distilled water and with the orange-flower water. Filter and pass enough distilled water through the filter to make the filtrate weigh 400 parts. Lastly, dissolve the sugar by cold percolation or by agitation and strain.

## MEDICINAL PLANTS USED BY THE CREE INDIANS, HUDSON'S BAY TERRITORY.

BY E. M. HOLMES, F.L.S.,

*Curator of the Museum of the Pharmaceutical Society.*

Mr. Walton Haydon, who has resided for some time in the Hudson's Bay Territory, recently presented to the Pharmaceutical Society a series of specimens of the drugs used by the native Indians, and with them has also contributed some information concerning their uses, which may be of interest in the future if placed on record. Only the native name of some of the drugs is known at present, but Mr. Haydon has promised to forward specimens of the plants from which they are obtained on his return to Hudson's Bay.

The remainder I have been able to identify.

*Pow-e-men-artic* (Fire Root, or Bitter Pepper Root).—This is the rhizome of *Acorus Calamus*, L., or a nearly allied species, and is used in coughs. The rhizome is rather more slender than met with in this country, being only about one-third of an inch in diameter, but seems to be quite as aromatic and pungent. It is not a little singular that there is hardly a country where this plant grows that the rhizome is not used in medicine.

*Wayakash*?—This is the liber of the bark of *Abies balsamea*,



Marshall, freed from the periderm and leaving exposed the numerous vesicles in which the Canada balsam is secreted. The bark is about one line thick, has a short fracture, and is of a white color when broken; the inner surface is pale-brown and the exterior reddish-brown. The taste is astringent and bitter, with a flavor of Canada balsam.

*Wakinakim*, the bark of *Juniperus communis*, L.—This is used to make a poultice for wounds. According to Mr. Haydon it is prepared for use by taking a stick and cutting it into pieces about four inches long, boiling it until the outer bark comes off easily, scraping off the inner bark and beating it between two stones into a pulpy mass, which is applied to the wound. Mr. Haydon has seen it so used, and remarks, "It certainly seems to clear a foul wound well, and is the usual remedy employed by Indians for wounds of all kinds." The beneficial action of the bark is doubtless due to its great astringency, and to the volatile oil present in it, which would naturally act as an antiseptic.

*Milawapamule*, *Cornus sericea*, Herit., (Red Willow Bark).—This bark occurs in two qualities, one being in the form of slender quills, 3 or 4 inches long, bearing a slight resemblance to the bark of *Rhamnus Frangula*, but free from scars. The transverse fracture is yellowish-white, the inner surface light orange brown, and the exterior of a deep chestnut brown color, but when fresh of a bright crimson; the taste is bitter and the flavor resembles that of tea. The second quality consists of fine scrapings of the young bark. The latter is the form in which the bark is used as an emetic in coughs and fevers. For coughs the bark is boiled in water and the decoction strained and given while still warm in the dose of a wineglassful every few minutes until vomiting supervenes. For colds and fevers a teaspoonful of the decoction is taken occasionally. The scraped wood is also smoked, mixed with tobacco. Boiled with rust of iron it is used as a black dye.

*Nepatihe*, or Green Alder.—This is the bark of *Alnus viridis*, DC. It consists of thin shreds which have evidently been scraped off the young branches. The inner surface is of a pale dull brown and the exterior greenish brown. It has a very astringent taste with a slight bitterness and a flavor recalling that of the leaves of *Arbutus Uva-ursi*. It is used in dropsy.

*Metoos* (*Populus*, Sp.?) Poplar Bark.—This bark is in the form of thin flat strips of liber about half an inch wide and half a line thick. It has a bitter, slightly mucilaginous taste with some astringency, and

a fibrous texture. The color externally is dull brown and on the inner surface yellowish. Another form of the bark consists of thinner pieces torn into fine shreds. It is used in coughs, half an ounce, in the form of decoction, being the dose.

The inner bark of the poplar is eaten in the spring by the Indians, and is considered to act as a mild purgative. Mr. Haydon says he has eaten pounds of it without any effect being produced. It is at that time of the year pleasant in flavor, being sweetish and very tender.

*Wetchus-y-usk-wa*, or Service Tree, (*Pyrus*, Sp.<sup>2</sup>)—This is in the form of thin shreds scraped off the young branches. It is of a yellowish-white color on the inner surface, and of a purplish-brown on the outer. It has a slightly bitter, very astringent taste, and a strong tea-like flavor. It is used by the Indians in pleurisy and inflammatory diseases.

*We-suk-a-pup* (*Kalmia angustifolia*, L.), Bitter Tea.—The twigs with leaves and flowers are used in bowel complaints and as a tonic. A small handful is boiled in two pints of water, and a teaspoonful taken occasionally. A nearly allied species *K. latifolia*, is said to have cured an obstinate case of diarrhoea. In this instance an ounce of the leaves was boiled in eight ounces of water down to four ounces, and thirty drops of the decoction were given four times a day. When given six times a day this quantity caused vertigo. A case of poisoning from the use of *Kalmia latifolia* is on record, in which glowing heat in the head, loss of sight, coldness of extremities, were followed by nausea and vomiting (*Edinburgh Med. Journ.*, 1856, p. 1014), and subsequently formication, weakness of the limbs and great prostration of the circulation, remaining for several hours. It is pointed out in the United States Dispensatory (p. 1678) that *K. angustifolia* most likely possesses similar properties. It is remarkable, therefore, that it should be used as a tonic by the Cree Indians. The coldness of the climate may, however, modify the development of the poisonous principle, and species closely allied to a poisonous one are not always poisonous, as in the case of *Aconitum heterophyllum*, or even *A. paniculatum*, the latter nearly resembling the poisonous *A. Napellus*. Among other drugs mentioned by Mr. Haydon as being in common use by the Cree Indians are—Cedar leaves (*Juniperus virginiana*?) and *Galium boreale* as diuretics; *Actæa spicata*, L., and *Iris versicolor*, L., as purgatives; *Mentha canadensis*, L., in the form of tea, as a stomachic; *Lobelia Kalmii*, L., as an emetic; *Solidago Virgaurea*, L., as a tonic; Fleabane (*Erigeron*

*canadensis*, L.?), in diarrhœa; the herb of *Prunella vulgaris* L., is chewed for sore throat.

*Karkar-pukwa* or Country Tea (*Ledum latifolium*, L.).—The fresh leaves are chewed and applied to wounds. The flowering tops are used as tea, and should be gathered when in full bloom. The dried flowers have an odor between that of tansy and chamomile. According to the United States Dispensatory the leaves are esteemed pectoral and tonic, and are said to have been used as a substitute for tea during the War of Independence. An account of the medicinal uses of this plant by the Indians of the North of Michigan will be found in the *Pharm. Journ.*, [3], viii, p. 850. By homœopaths it is used as a remedy for tender feet, especially when associated with rheumatism, and the tincture is highly esteemed for relieving the pain of the stings of insects. (See also *Amer. Jour. Phar.*, 1878, p. 54.)

*Betula alba*.—The white rotten wood of this tree is boiled in a decoction of *Ledum latifolium* for an hour. The wood is afterwards dried, rubbed to powder and sifted. In this state it is used for chafed surfaces, the flesh being washed with cold water and the powder then sifted on it. Mr. Haydon speaks highly of its value for this purpose, having had personal experience of its efficacy on chafed feet, etc. It is also used as a dusting powder for children.

*Prunus virginiana*, L.—The bark is used fresh, as a rule. It is used as a cure for diarrhœa. For this purpose a handful of the bark is scraped off a young bough and boiled in about a pint of water and a wineglassful used as a dose.

Castoreum is used to make a poultice for sprains.

Other plants used in medicine by the Cree Indians are *Apocynum hypericifolium*, Ait., and *Comandra livida*, Rich.

Leaves and barks used as an application to wounds are always chewed before being used. Emetics and purgatives are taken in the form of a decoction, a wineglassful is administered occasionally until the desired effect is produced.

Vermillion is also used in medicine, and the method of using it is as follows: It is mixed with gunpowder damped and lighted, the patient sitting in a closed tent and inhaling the fumes.

Although the list of materia medica is a small one there is remarkable judgment shown in the choice of remedies. Thus, *Prunella vulgaris* makes an excellent substitute for *sal prunella* balls in sore throat, and the bark of the juniper and Canada balsam tree are doubt-



less as good an application to wounds as a people unversed in antiseptic applications and ignorant of the existence of bacteria could devise. The use of a *Lobelia* as an emetic and of *Iris versicolor* as a cholagogue and purgative approaches closely to the practice of more civilized nations. The simple device of bleeding from an artery by piercing it with a sharp flint and stopping it by pressure with a button of wood and a bandage shows a respectable knowledge of surgery.—*Pharm. Journ. and Trans.*, October 18, 1884, p. 302.

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### BRAZILIAN DRUGS AT THE VIENNA EXHIBITION.

The *Zeitschrift des Allgemeinen österreichischen Apotheker-Vereines* now enables us to quote a series of notes upon the uses, etc., of these drugs. Very little is known about some of them in this country, and as South American drugs are frequently sent over to England, some of the information which has been furnished to the above may at a future time be found useful for reference. These notes are furnished to the above journal by Gustave Peckolt, apothecary at Rio Janeiro, son of the well-known botanist, Dr. Theodor Peckolt.

*Carquega Amargosa*.—The leaves of *Baccharis genistelloides*, Pers. (*Compositæ*).—The powerfully bitter leaves serve as a substitute for wormwood. A tea prepared from these leaves is much used for indigestion and diarrhoea, 12 grams of the leaves being infused in 600 grams of water and taken in doses of a wineglassful. An aqueous extract is used in conjunction with salts of iron for debility and anæmia; a spirituous extract in doses of 2 grams for liver disease, and the bitter resin every two hours in intermittent fever between the attacks.

The fresh leaves analysed by Dr. Theodor Peckolt were found to contain in 1,000 parts 1·347 per cent. of a volatile oil and 17·948 of a dark green soft resin soluble in ether, 11·218 of a dark green hard acid resin insoluble in ether, 3·236 of a brown bitter resin, 8·413 of a tannin giving a green precipitate with iron salts; also wax, fat, etc.

The fresh leaves afforded 10 per cent. of watery extract and 9 per cent. of a spirituous one.

The leaves are said to be exported in considerable quantity to France for preparing a secret remedy or some other purpose. The idea seems to suggest itself that this may be used as an ingredient of absinthé.



*Jaborandi*.—Mr. Peckolt remarks that various leaves of other rutaceous plants, more especially of the genus *Xanthoxylum*, are exported under this name by ignorant collectors (see *Pharm. Journ.*, October 20, 1883, p. 476, and *Pharm. Centralhalle*, No. 37, 1875).

*Jurumbeba* (*Solanum insidiosum*, Mart).—The leaves and unripe fruit are much used at Rio in vesical catarrh and liver disease. The drug is taken in the form of wine or pills and a plaster made with the extract is also applied externally. The dose of the leaves is 2 grams in 500 grams of infusion, a wineglassful being taken four times a day; of the extract 0.051 gram in the form of a pill four times daily. (See also "Amer. Jour. Phar.," 1877, p. 506.)

*Mangueira*.—The flowers of the mango, *Mangifera indica*, L. (*Anacardiaceæ*), are used either in the form of tea or powder for catarrh of the bladder. The powder is also used in the form of fumigation against mosquitoes.

*Rosa de Caboclo*.—The freshly expressed juice of the Indian rose plant, *Langsdorffia hypogæa*, Mart. (*Balanophoraceæ*), is used as an aphrodisiac, and the flower buds are eaten by the Indians.

On analysis 1,000 grams of the fresh roots of the plant yielded 9.015 grams of a soft bitter resin, and 7.768 grams of a yellow resinous acid soluble in ether, 3.137 per cent. of a brown resin insoluble in ether, 4.018 per cent. of a crystallized vegetable acid, 32.100 grams of a wax giving off a vanilla odor when heated, as does also the extract of the root. The vegetable acid does not correspond in chemical reactions with any known acid and seems to deserve further investigation.

*Cipó de Chumbo* (*Cuscuta racemosa*, Mart.).—The expressed juice of the fresh plant is used in menorrhagia and catarrhal affections. The decoction is taken internally and used externally for *crusta lactea* and as a gargle for inflammation of the throat. The powdered herb is said to be useful as a vulnerary.

*Castanha de Cera* (*Pachira*, Sp.).—The leaves possess mucilaginous properties. The seeds contain 25.385 per cent. of a colorless fat, melting at 77°F. and are edible. The tree affords a strong bast.

*Crua* or *Melao do baboclo* (*Sicana odorifera*, Naud., *Cucurbitaceæ*).—In the ripe state it (the fruit) has a very pleasant odor. The juice is used as a refrigerant and antifebrile remedy, and the seeds are regarded as a powerful emmenagogue.

*Fava contra* (*Canavalia gladiata*, DC. *Leguminosæ*).—The seeds

are used as a remedy against the bites of serpents. The seeds are pounded with rum, the liquid pressed out and drunk, and the expressed portion applied to the bitten part.

*Fructo de Abutua* (*Abuta rufescens*, Aubl.).—The root is a considerable article of export as Pareira brava; it would be interesting to know for what purpose it is used, as it is impossible that the thousands of kilos exported should be used for medicinal purposes.

*Fructo de Arradiabo* (*Cnidoscalus neglectus*, Pohl. *Euphorbiaceæ*).—In Pernambuco the freshly bruised leaves are used as a poultice for carbuncle. The leaves and husk of the fruit are furnished with glandular hairs which sting most virulently, causing blisters where they touch the skin and giving rise to fever. The seeds contain 31·5 per cent. of a purgative oil.

*Fructus de Barbatimao* (*Stryphnodendron polyphyllum*, Mart. *Leguminosæ*).—The pods contain soft sweet pulp, with a styptic after-taste, and are used for hemoptyses. The fresh pods were found by Dr. T. Peckolt to contain 7·9 per cent., and the dried pods 17·584 per cent. of tannin, which gives a black precipitate with ferric salts.

*Fructos de almecega* (*Protium heptaphyllum*  $\beta$  *brasiliense*, Engl. *Burseraceæ*).

*Fructos de Buchuiha* (*Luffa operculata*, Cogn. *Cucurbitaceæ*).—The fruits are as drastic in their action as colocynth, and are used in dropsy, amenorrhœa, liver complaints, and tropical anæmia (opilacæo). For dropsy, a fruit is boiled for some time, strained and beaten until cold, into a froth like white of egg, and a tablespoonful given every half-hour until vomiting or purging take place. In the northern provinces of Brazil it is used indiscriminately by the common people in all diseases, and, consequently, is sometimes used with bad results. For general use a bottle is half filled with the sliced fibrous part of the fruit, the bottle filled with rum and allowed to stand a day in the sun. In any indisposition a small dram glassful is taken, which usually produces six to eight evacuations.

*Fructos de Copaiba* (*Copaifera nitida*, Mart.).—The pods are used only by herbalist in the treatment of gonorrhœa, but with success. It is noteworthy that the pods contain 19·568 per cent. of a soft resin, having the odor of balsam of copaiba, and that the odor of copaiba is found only in the wood, bark, and pods of the tree, the black seeds containing 3·558 per cent. of a fat oil, having the odor of tonka

bean, and the orange yellow arillus surrounding the seed being free from odor.

*Fructo de Cujeté* (*Crescentia Cujete*, L.).—The pulp of the unripe fruit is beaten with sugar and taken in teaspoonful doses as a remedy for catarrh and bilious fever, and the expressed juice in doses of 8–15 grams in the treatment of convulsions. In the province of Pernambuco the full grown unripe fruit is heated over a fire until the shell begins to crack, and the pulp then removed, or squeezed out while hot, and given in doses of two spoonfuls for traumatic tetanus. The herbalists mix the heated mass with tapioca meal and make it into pills, or rather boluses, which they give for elephantiasis. Externally, it is applied to ruptures, and as a poultice for headache, bruises, scalds, and to ripen boils. The seeds are also used by the common people as a tæniifuge. The not pleasant pulp of the ripe fruit is eaten by negroes and Indians without unpleasant results. With the juice of the ripe fruit a cough linctus is prepared. The pulp, on examination was found to contain malic, tartaric and crescentinic acids, a tannin giving a green color with salts of iron, a bitter substance, brown resin, etc.; a kilogram of the fresh unripe fruit afforded 292.700 grams of juice, which yielded 1.690 gram of crescentinic acid crystallized in four-sided prisms from the alcoholic solution. The seeds contain an acrid, bitter, fat oil.

*Jaca* (*Thevetia neriiifolia*, Juss. *Apocynaceæ*).—One kernel eaten, or pounded with milk and drunk, acts as a purgative in about a quarter of an hour; sometimes also producing vomiting. The usual dose as a purgative is half a seed, in rheumatism and dropsy. It is also a popular remedy for snake bites. Two seeds are beaten with a beer-glassful of rum and strained, and a tumblerful taken every half-hour or hour and the residue applied to the wound. It is now, however, becoming supplanted by the subcutaneous injection of permanganate of potash. Notwithstanding that the activity of this antidote is doubted in Europe Mr. Peckolt says that in Brazil there is almost daily proof of its distinct efficacy.

*Fructo de Papagaio* (*Mahonia* sp. ?)—In the province of Minas, this fruit is called “Moribo,” and in San Paulo “Moluro.” It is a popular remedy for gonorrhœa. Parrots are very fond of the fruit.

*Fructo de Peroba* (*Aspidosperma Peroba*, Tr. Allen. *Apocynaceæ*).—The seeds are used as a purgative.

*Laranjas de Mato* (*Gardenia suaveolens*, Vell. *Cinchonaceæ*).—The



bitter root-bark is used as a tonic in intermittent fever. The fruit is roasted in ashes and eaten by the Indians.

*Baunilha do Rio* (*Vanilla palmarum*, Lindl. *Orchidaceæ*).—The pods are collected in the province of Rio de Janeiro, in abundance on the banks of the river Parahyba, and would by proper treatment afford a good article of export. They contain 1.03 per cent. of vanillin.

*Casca de Angrio Vermelho* (*Piptadenia gida*, Benth. *Mimoseæ*).—Much used as an alterative and blood purifier, being given in decoction made in the proportion of 60 grams to 500 grams of water, and strained. Externally it is used in the form of decoction or fluid extract as an application for œdema of the feet and chronic ulcers. The wood of the tree is valued as timber and the sawdust is used for preparing a fluid extract of syrupy consistence which is used as a vulnerary. It was used by Dr. Peckolt in a hospital at Rio de Janeiro for wounds, and in three days the pus had nearly disappeared, and in twenty days the wounds were perfectly healed. The sawdust was found to contain 5.128 per cent. of a soft resin soluble in ether, and 20.512 per cent. of tannin. A tincture of the leaves is also used for bruises and cuts.

*Casca de barbatimao* (*Stryphnodendron polyphyllum*, Mart. *Mimoseæ*).—The bark is frequently exported to Europe as *Cortex adstringens*. According to Dr. Peixoto the decoction of the fresh bark, or the powder in the form of a poultice, is useful for unhealthy sores, and as an injection for leucorrhœa or passive hæmorrhage. It is used in the form of snuff for epistaxis, and the extract in the form of plaster for rupture. In cases of *post-partum* hæmorrhage a decoction is made of 20 grams of the bark to 240 of water, the decoction strained, and 4 grams of acetic ether added; of this mixture a tablespoonful is given every hour. Dr. T. Peckolt found in the fresh bark 0.792, and in the fresh leaves 0.528 per cent. of a tannin which gives a green precipitate with salts of iron.

*Casca de Cedro Vermelho*, *Cedrela vellosiana*, Rœm.—According to some writers on Brazilian drugs the bark possesses emetic properties, a statement that has also been copied in some French works. According to Dr. T. Peckolt's investigations in the hospital of Rio Janeiro the statement is not supported by facts. He gave the decoction in the dose of 40 grams of the bark to 240 grams of water without the least symptom of nausea being produced, and in one patient suffering from dysentery, in whose case an emetic was indicated, the decoction cured



the patient. The fluid extract is given with success in diarrhœa, a tablespoonful being given every three hours of a mixture of 8 grams of the fluid extract in 120 of water. The fresh bark was found to yield only 0.03 per cent of tannin, which gives a black precipitate with iron salts. Ten kilograms of the dried bark yielded 1.976 grams of a volatile oil, having the odor of the wood.

*Casca de Raiz de Cipo Suma* (*Anchietea salutaris*, St. Hil. *Violaceæ*).—The root bark is officinal, and is much prized as a remedy for syphilis and herpetic eruptions. It is also used for whooping-cough in the form of syrup, 4 grams of tincture mixed with 30 of simple syrup. The decoction is prepared of the strength of 30 parts of the root to 500 of water; the powder is taken in doses of 2 to 6 grams three times a day.<sup>1</sup>

*Casca de Guaranhem* (*Lucuma glycyphlœum*, Eichl. *Sapotaceæ*).—Dr. Peckolt found in monesia bark 22 per mille of monesia—taunic acid—which gives a black coloration with iron salts, 6.960 of gallic acid, 2.800 of monesin, an aerid amorphous body, 0.090 of lucumin, a body crystallizing in silky needles, 1.130 of a bitter substance and 15.000 of glycyrrhizin, tartaric and citric acids, wax, etc.

The dose of the decoction is made from 30 grams of the bark boiled in 500 grams of water. Of the extract (known as monesia), the dose is 0.6 to 1.5 gram, taken during the day. The tincture is prepared from 1 part of the bark and 5 of spirit of wine.

*Casca de Mulungu* (*Erythrina Mulungu*, Benth. *Leguminosæ*).—A largely used and much valued remedy. In small doses it acts as an anodyne and sedative; in larger doses it produces sleep without causing excitement; it is also used in cases of hypertrophy. It is added to baths to relieve rheumatism.

This drug has no doubt an important future, and it is well worthy of further examination from a physiological and a therapeutic point of view. The active principle has not yet been obtained in a definite form, although a yellow odorless resin and a strongly narcotic extract of a disagreeable bitter taste, tannin and nitrate of potash have been prepared from the bark.

*Casca Paratudo* (*Hortia arborea*, Engl. *Rutaceæ*).—The bark is an excellent tonic; it has an agreeable aromatic odor, a mild bitter flavor with a burning after-taste, due to the presence of volatile oil. It is a favorite tonic for weak digestion. The infusion is used in zymotic

<sup>1</sup> See *Archiv der Ph.*, 1852, Bd. 97, p. 271.

fevers, especially when severe (*atutische*) skin eruptions are present.

The dose of the powdered bark is 0.5 to 1 gram. A concentrated infusion is used as an enema in *prolapsus ani*.

*Casca de Pao Pereira* (*Geissospermum Vellozii*, Fr. Allen).—The active principle, geissospermine, is best prepared by making an alcoholic extract, distilling off the alcohol and treating the residue with acidulated water and precipitating with ammonia. When prepared directly from a watery extract of the bark, the alkaloid is purified with difficulty.

*Casca de Sangue de Drago* (*Croton erythæma*, Mart. *Euphorbiaceæ*).—The bark is a favorite astringent. A decoction of the fresh bark evaporated to an extract of a weak syrupy consistence is known as *mellado de sangue de drago*. In chronic diarrhœa of adults the dose is a teaspoonful three times a day; for children a teaspoonful of a mixture of 2 grams of the extract with 60 grams of water every three hours. It is employed in the form of injection for gonorrhœa and leucorrhœa. It has also been used as a vulnerary with success.<sup>1</sup>

*Casca de raiz Timbo* (*Lonchocarpus Peckoltii*, Waura, *Leguminosæ*).—A very powerful narcotic drug, which deserves to be introduced into Europe.

*Casca de Tinguaciba* (*Xanthoxylum Tinguassiba*, St. Hil. *Rutaceæ*).—The decoction is used as a powerful sudorific, and in the form of a gargle for affections of the throat, also as an addition to odontalgic tincture. Dr. Peckolt has found in the bark an alkaloid producing effects similar to those of pilocarpine.

*Quina do Remijio* (*Remijia ferruginea*, Ol. *Cinchonaceæ*).—The root-bark has long been used as a remedy for intermittent fever by the wandering natives. The active principle is an acid resin having a shining crystalline appearance and named by Dr. Peckolt *vieirin* after Dr. J. A. Vieira de Mattos, who discovered it in 1860. The *vieirin* can be prepared by exhausting the powdered bark with water rendered alkaline with ammonium or sodium hydrate and precipitating the liquid with acetic or hydrochloric acid. If extracted by means of milk of lime and alcohol it is obtained in a shining crystalline form resembling *santonin*. It is soluble in alcohol and alkalies and is given in a mixture with wine and bicarbonate of sodium.

*Raiz de azedinha grama* (*Oxalis violacea*, Vell.).—Root used as a diuretic; it is sweet and edible.

<sup>1</sup> See also *Archiv der Pharm.*, 1862, Bd. 108, p. 142.

*Raiz de Calumba de Brasil*.—This is used as a tonic in weak digestion and for diarrhœa. *Simaruba salubris*, Engl.

*Raiz de Jaborandi do Rio (Artanthe Mollicoma, Miq.)*—Root used as a diuretic and in liver complaints. See Peckolt in *Pharm. Centralh.*, 1878, No. 37.—*Pharm. Journ. and Trans.*, October, 1884, p. 327.

## EULACHON OIL—A SUBSTITUTE FOR COD LIVER OIL.

By A. B. LYONS, M. D., Detroit, Michigan.<sup>1</sup>

The bays and estuaries of the Pacific coast of British America and Alaska, are annually visited by immense shoals of a small fish popularly known as the candle fish, or, adopting the vernacular name, as the eulachon or outachon. This fish belongs to the family of the salmonidæ, and bears the scientific name *Thaleichthys pacificus* (Richardson) Girard. It is nearly allied to the capelin, which it resembles also in its habits.

The Indian name is variously spelled eulachon, eulachan, hoolacan, oolachon, ootachon, etc., and is corrupted by the English settlers at Victoria, into hoolakins.

The fish is also frequently confounded with other species, and in Oregon is generally known as smelt. Its habitat is the northern part of the Pacific ocean. In spring it approaches the shores to deposit its spawn, entering the bays and estuaries in countless numbers. It never goes far from the Ocean however, although multitudes of the fish are taken near the mouths of the large rivers, particularly in Frazier's river and in the Naas.

The candle fish is less than a foot in length. It is described as having a somewhat pointed and conical head, a large mouth, teeth on the pharyngeals, and the tongue rough; the lower jaw, palatines, and vomer destitute of teeth. Its color is greenish yellow on the back, passing into silvery white on the sides and belly, sparsely spotted with dirty yellow. The spawning season is in April and the first half of May. During their run they furnish food not only to the Indians, but to thousands of sharks, halibut, porpoises, and other predatory fish. As a pan fish the eulachon is said to have no superior, but the fish is valued chiefly for its oil, which is used as food by the Indians. So rich in oil is the entire fish that when dried, it serves the natives for torches,

<sup>1</sup> Analytical Department, Laboratory, Parke, Davis & Co.

whence the name candle fish. The aborigines take the fish in immense numbers by the aid of a primitive contrivance, resembling a rake or comb, the moonlight nights being the most favorable time for carrying on the operation.

The fish are submitted to a rude operation for "rendering" the oil, or they are dried, and smoked. In recent times the dried and salted fish have become an important article of export from Victoria, and there is now on the Naas river a manufactory for the oil, which has been employed to some extent in England as a substitute for cod-liver oil. It has been used medicinally to a considerable extent in British Columbia, but I do not find any record of clinical observations with regard to its therapeutic value.

Chemical analysis, of course, cannot reveal the medicinal properties of any drug. Cod-liver oil itself is an example of this. While universally accepted as an agent of singular efficiency in promoting nutrition, particularly in strumous and tubercular patients, it has thus far guarded as a profound secret the cause of its efficiency, and the reason of its superiority in this respect over other oils, vegetable or animal. It has been frequently subjected to chemical analysis, and one wonderful discovery after another announced with flourish of trumpets, each supposed, for a while, to furnish a key to the mystery, but each in turn has been abandoned, and the medical profession generally regard the remedy as nothing more than a concentrated and easily assimilated food. Iodine, phosphorus, iron, biliary acids, cholesterin, and oxide of propyl are among the constituents of the oil which have been supposed to give it its peculiar medicinal character, but none of these substances is present in a quantity sufficient to justify any such hypothesis, and one after another all have been abandoned as unsatisfactory.

Some other animal oils, however, have been found to improve nutrition in much the same way as does the familiar cod-liver oil; only by clinical experiments can we determine the value of any new claimant for a share of the honors which cod-liver oil has monopolized.

A comparison of the oils, however, may prove of interest and, possibly, even of value, should eulachon oil become a common article of commerce, whether it should prove to be more or less valuable than its rival.

The oil of the candle fish as it is sent into the market at present contains much palmitin and, probably, stearin, so that at common temperatures it is only semi-fluid.



The olein, which for medicinal purposes, at least, must be regarded as eulachon oil, forms a limpid fluid of a pale straw color and fishy odor, unlike that of cod-liver oil, perhaps, to many, less repulsive. Personally, I find it impossible to overcome my natural aversion to any fish oil; those who are less fastidious in their tastes, declare that the oil of the candle fish is positively delicious. Probably most patients would find little to choose between eulachon and cod-liver oil.

In specific gravity the eulachon oil differs from any other oil heretofore described. At a temperature of  $59^{\circ}\text{F.}$  ( $15^{\circ}\text{C.}$ ), water at the same temperature taken as standard, its specific gravity is 0.9071; at  $77^{\circ}\text{F.}$  ( $25^{\circ}\text{C.}$ ), the apparent sp. gr. is .9012, referred to same standard. The specific gravity of cod-liver oil ranges from 0.92 to 0.93, generally being about 0.927, at  $59^{\circ}\text{F.}$  Other fish oils have nearly the same range of specific gravity, and the vegetable oils which consist chiefly of olein, are only a trifle lighter, sp. gr. 0.915 to 0.920; and the same is true of animal oils, like lard oil, neat's foot oil, etc., which consist mainly of olein. Shark oil is much lighter (sp. gr. 0.870), and so also is sperm oil (sp. gr. .875 to .883.) I do not know whether shark oil has been subjected to chemical analysis, but from its specific gravity one may infer that it does not consist wholly of olein, and this is known to be the fact in regard to sperm oil.

In viscosity there is a notable difference between cod-liver oil and the eulachon oil. Under the same conditions of temperature and pressure, 40 parts only of the eulachon oil will flow from an orifice which will discharge 45 or 46 parts of cod-liver oil. Experiments, however, must embrace a larger number of samples than mine have done to be of much value.

When mixed with sulphuric acid (5 volumes of oil with one of acid) the temperature rose  $55^{\circ}\text{C.}$  ( $100^{\circ}\text{F.}$ ). With cod-liver oil the elevation of temperature is about double this,  $112^{\circ}\text{C.}$  ( $202^{\circ}\text{F.}$ ).

The color reactions with acids are quite different from those of cod-liver oil. Mixed with one-third its volume of nitric acid (sp. gr. 1.27), it develops at once a pink color, which fades slowly to amber. After 15 hours' standing the mixture is considerably thickened, and is of a deep amber color, with a reddish cast. Cod-liver oil treated in the same manner turned at first pink, faded rapidly to pale amber; after 15 hours the color remained pale amber, and the mixture was more fluid than the former, but with thickened portions partially separated.

With Cailletet's test, a mixture of phosphoric acid, sp. gr. 1.44, 12

parts, sulphuric acid, sp. gr. 1·84, 7 parts, nitric acid, sp. gr. 1·37, 10 parts, eulachon oil produces at once a pink color, fading to a shade of brown; at the end of 15 hours the color of the solution was of a pale reddish brown.

Cod-liver oil shows a similar initial coloration under this test, but fades to straw color or amber, if the oil is pure.

Sulphuric acid does not produce in eulachon oil the rich purple color which it gives cod-liver, and other oils containing biliary constituents. It produces instead a deep brown, verging as much toward yellow as toward red.

With the elaidin test eulachon oil solidifies rapidly; after 15 hours a small portion only of the oil remains unsolidified—color of the mixture, brown. In the case of cod-liver oil the action is much less rapid; at the end of 15 hours there remains still a large proportion of fluid, which is of a very dark color—resembling molasses.

The oil leaves only a trace of ash when ignited, and the constituents of this probably are unimportant. The oil probably contains, like cod-liver oil, a trace of iodine—the quantity of this element present in the latter is greatly over-stated in the books. It is altogether too minute to be regarded as of any influence, even if the iodine is present as is believed by some, in the form of an organic compound. All fish oils have been found to contain iodine, and in proportions not much smaller than the cod-liver oil itself.

A portion of the eulachon oil was saponified and the soap decomposed. The fatty acids thus obtained amounted to 95·85 per cent. of the oil. As appeared subsequently, however, this is not all fatty acid.

The oil was found to contain about 20 per cent. of palmitic and stearic acids, 60 per cent. of oleic acid, and 13 per cent. of an unsaponifiable substance, which is the most peculiar and interesting thing about it. This substance is of an oily consistency at ordinary temperature in summer, has much lower specific gravity than oleic acid, or any other constituent of ordinary fats, sp. gr. ·865 to ·872 at 59°F., and seems to resemble the unsaponifiable constituent of sperm oil.

This interesting substance I hope hereafter to make the subject of further investigation to determine its chemical composition, and its behavior towards reagents. At present it is enough to call attention to its existence as a considerable constituent in this oil, and to suggest the probability that it may give to the oil properties quite distinct from

those of most animal oils. The low specific gravity of the substance, and its indifference to most reagents remind one strongly of the paraffins, and now that petroleum and petroleum oil are recognized to have a positive influence in tuberculous complaints we shall not be surprised if we find that eulachon oil owes any therapeutic power it may be found to possess to this peculiar body.

Cod-liver oil, it is true, does not contain anything corresponding with this substance, or if it does the quantity must be very small. Cod-liver oil contains about 80 per cent. oleic acid, 8 or 9 per cent. of palmitic and stearic acids, and only 1.82 per cent. (Allen) of unsaponifiable matter, a considerable proportion of which is cholesterin.—*Therapeutic Gazette*, September 15, 1884.

## BRIEF NOTE ON OIL OF LIMES.

BY FRANCIS WATTS, F.C.S.

The recent notes on oil of limes in the Journal of the Pharmaceutical Society appeared to indicate that the distinguishing characters between hand made and distilled oil of limes were not very generally known. The following memoranda will perhaps prove of interest.

Ecuelled or hand made oil is of a decidedly yellow color, varying in intensity, being darker in new specimens. The specific gravity also varies, being higher in newer samples; the mean specific gravity of seven samples, all under twelve months old, being .8734. The following table gives a number of carefully determined specific gravities of various samples, all fairly new.

Temperature = 20° C. (68° F.)		Water at 4° C. = 1.0000.	
Age.	Sp. gr.	Age.	Sp. gr.
Under 24 hours.....	.8755	About 6 to 7 months.....	.8722
2 or 3 days.....	.8750	About 5 to 6 months.....	.8719
About 7 months.....	.8737	About 18 months.....	.8709
About 6 months.....	.8732		.8704
About 8 months.....	.8726	Distilled.....	.8554

Ecuelled oil may be regarded as an almost saturated solution of citropten, or lime camphor, and this may be made a means of distinction.

The difference in flavor and aroma is so marked as to scarcely require any other means of distinguishing ecuelled from distilled oil, the ecuelled having a decided and fragrant lemon-like smell, whilst the distilled is very inferior, frequently possessing little more than the smell of turpentine.

The distilled oil is usually almost colorless, is specifically lighter, of inferior aroma, and contains no citroptene.

When this citroptene is treated with oxidizing agents, *e.g.*, nitric acid or preferably chromic acid mixture, a red resinous acid body is produced (probably the limettic acid of Vohl).<sup>1</sup> So that if a sample of oil of limes be agitated with chromic acid mixture for some few minutes and the mixture filtered, the red resin will be left on the filter and sides of the test tube, if the oil be hand made; but will not appear if simply distilled.

When agitated with Nessler's test ecuelled oils give pale yellow mixtures (apparently darker mixtures as the oil becomes older). Distilled oils, on the other hand, give dark grey and black mixtures, thus affording a marked distinction. Old resinized ecuelled oils, too, give dark greenish-grey mixtures.

By means of Nessler's test I believe it would thus be possible to detect admixtures of from 5–10 per cent. of distilled oil; but I have not yet had an opportunity of studying the reaction in the case of old but carefully preserved samples.—*Pharm. Jour. and Tran.*, October, 1884, p. 322.

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CHLOROFORM AND CROTON OIL FOR TAPE-WORM.—Dr. Bernard Persh, according to the "Medical and Surgical Reporter," has most satisfactory results in cases of tape-worm with chloroform and croton oil. He suspends one drop of croton oil and a drachm of chloroform in one ounce of glycerin; this to constitute one dose. The medicine is best given in the morning before breakfast, and no preparatory treatment is required, except half an ounce of Rochelle salt on the evening preceding the removal. The preliminary laxative is not necessary to effect a cure, and it was omitted in several cases; but its administration facilitates the examination of the evacuations, prevents breaking up the worm by hard feces, and allows the parasite to pass more quickly through the intestines after becoming detached. The medicine is not unpleasant to take, and acts quickly. If any intestinal irritation is caused it may be controlled with bismuth and opium after the expulsion of the worm.—*Weekly Med. Review*, November 8, 1884.

<sup>1</sup> These bodies are at present under investigation.



## ESTIMATION OF MORPHINE IN OPIUM.

BY V. PERGER.

The author has carefully examined the methods in ordinary use for the estimation of morphine in opium, as to their relative accuracy, making analyses of the same sample of opium by each method, and finds that they give most variable results. The methods in common use are Godeffroy's, Austrian Pharmacopœia, and Merk's.

*Godeffroy's method* is as follows: 10 grams of dry opium powder are mixed with 25 cc. of hot water, and then pressed between folds of linen, this operation being repeated until the water is no longer colored. The liquid is then boiled two or three times with 8 to 10 grams of slaked lime and filtered; ammonium chloride is added to the filtrate until after standing it smells of ammonia. The morphine crystallizes out after 12–24 hours, and can be estimated by collecting it on a tared filter and washing it with dilute ammonia.

*The Austrian Pharmacopœia method* is as follows: 10 grams of dry powdered opium are treated with 90 grams of a mixture consisting of 140 grams of distilled water and 40 grams of hydrochloric acid (12·2 per cent.). The residue remaining after filtering and washing is weighed. If the opium be good, it should not exceed 4·5 grams. The filtrate is mixed with 20 grams of powdered sodium chloride, and allowed to remain for 24 hours in the cold. The precipitate is then collected and washed with a saturated solution of sodic chloride. The filtrate is treated with ammonia and allowed to stand for 12 hours. The morphine which crystallizes out is separated by decantation, collected on a filter, and washed with as small a quantity of distilled water as possible; it is then dried in a porcelain basin, and treated with an equal weight of a mixture consisting of equal weights of acetic acid (20·4 per cent.) and water. After adding water the liquid is filtered. The filtrate should not exceed 70–80 grams. An excess of ammonia is added to it, and it is allowed to remain for 12 hours, when the precipitate is collected and weighed. The weight should exceed 1 gram.

*E. Merk's method* is as follows: 15 grams of opium are cut up and boiled with 100 grams of 45 per cent. alcohol. The extract is separated from the residue by filtration, and the latter is again treated with 100 grams of alcohol; 8 grams of crystallized soda are added to the

solution, and it is evaporated without stirring. The residue is treated with 60 grams of cold water, and decanted into a glass cylinder; the clear liquid is poured off, and the undissolved portion washed again with 30 grams of cold water, and then with 45 grams of alcohol (90 per cent.), and finally collected. The crystalline mass remaining on the filter is dried between filter-paper, dissolved in 15 grams of acetic acid (1 part of acid sp. gr. 1.06 to 8 parts of water) and 15 grams of distilled water, and then filtered through the same paper on which the residue was collected. The filtrate is treated with ammonia, and the precipitate is collected and weighed after standing for 12 hours.

The author has devised the following method: 10 to 20 grams of the opium to be examined are boiled for a short time with 15 to 30 grams of caustic baryta and about 150 to 200 cc. water. The mixture is then filtered, and the residue repeatedly boiled with small quantities of water until the solution fails to give a reaction with molybdic acid and sulphuric acid. Excessive boiling is to be avoided, and as a rule the filtrate should not amount to more than 400–500 cc. A stream of carbonic anhydride is passed into this solution, which contains all the morphine, until the liquid is supersaturated, and then the whole is evaporated on a water-bath as quickly as possible. The residue is moistened with absolute alcohol, transferred to an Erlenmeyer's flask, and exhausted with successive quantities of boiling absolute alcohol until a sample evaporated on a watch-glass no longer gives a morphine reaction. This usually requires from 300 to 400 cc. alcohol. The alcohol is removed by distillation, and the residue left in the flask is allowed to stand for some time with 15 cc. of ammonia. It is next collected on a tared filter, dried at 40°, and treated repeatedly with chloroform. This is the crude morphine. It should be light-brown to straw-colored. Crude morphine generally contains substances which can be classed under two heads, namely, (1) those which are insoluble in acetic acid; (2) those which are soluble, but which are reprecipitated by ammonia and potassium ferrocyanide. The author finds that the amount of the impurities is always small, and that the difference between the crude and the pure morphine is principally due to the loss of morphine in the process of purification. The following table gives the percentages of morphine found by employing the various methods. The impure products are marked thus\*.

## PERCENTAGE OF MORPHINE.

Opium.	E. Merk.	Aust. Pharm.	Godeffroy.	v. Perger.
I.....		4.17*	1.63*	9.04
II.....	5.99	2.04*	0.507*	8.37
III.....		.....	5.567	9.1
IV.....	9.32	0.253*	8.52	11.0
V.....	1.72	0.3*	1.17*	3.68
VI.....	13.57	2*	8.42	14.75

—*Jour. Chem. Soc.*, 1884, p. 1218; *Jour. prakt. Chem.* [2], xxix, p. 97.

[NOTE.—The extraction of morphine by *macerating* opium or its preparations with water and large excess of baryta was recommended by F. F. Mayer in “*Amer. Jour. Phar.*,” 1863, page 387.—EDITOR.]

REMARKS ON TESTS FOR ALBUMEN IN THE URINE,  
NEW AND OLD.<sup>1</sup>

BY GEORGE JOHNSON, M.D., F.R.S.,

*Professor of Clinical Medicine, Senior Physician to King's College Hospital.*

In a paper on the above subject in the recently published *Manchester Medical Chronicle*, Dr. William Roberts, referring to the fact that the urine in health contains various forms of albuminoid matter, expresses his belief that the new tests for albumen which have recently been brought into prominence, especially picric acid, tungstate of soda, potassio-mercuric iodide, and the acidulated brine-test, “produce frequently in the urines of perfectly healthy persons a reaction which is undistinguishable from the reaction which indicates disease or abnormality.” This point was put to the proof by the examination of the urine of thirty-one healthy persons—students, candidates for insurance, and others, who exhibited no signs of disordered health, and in whose urine heat and nitric acid gave no indication of albumen.

Dr. Roberts, of course, needs not to be reminded that albumen, in greater or less abundance, and for long periods of time, may be unquestionably present in the urine of persons who exhibit no signs of

<sup>1</sup> From the *British Medical Journal*, October 11.

disordered health. If this were not so, albuminuria would not be so frequently unsuspected and overlooked as it is.

Dr. Roberts proceeds to state that "the acidulated brine-test gave a reaction in eleven cases, picric acid in fourteen, the tungstate test in twenty-eight, and the mercuric iodide in twenty-nine cases."

Deferring for the present what I have to say of picric acid, I should have expected, from observations which I have quite recently made, that the other three tests would give a slight but appreciable reaction in every specimen of normal urine. It is a fact that all normal urine contains a small but variable proportion of mucus.

Now, mucin is precipitated by dilute acetic acid and mineral acids. (See the article "Mucus," in Watt's "Dictionary of Chemistry," vol. iii, p. 1059-60). It is also precipitated, as Dr. Oliver has shown ("Bedside Urinary Testing," p. 37), by citric acid. The addition of a small quantity of acetic or citric acid to normal urine gradually renders it slightly but decidedly turbid, by coagulating the mucin; and Dr. Roberts mentions the fact that, when nitric acid is added to albuminous urine, "the albumen is thrown down just about the line of junction of the two liquids, while the mucin is brought into view toward the upper part of the column of urine, where it gradually forms a diffused haze, quite distinct from the opalescent haze at the line of junction."

To this I may add that, when nitric acid is placed at the bottom of a column of normal urine, a diffused haze of coagulated mucin may commonly, after a time, be seen near the upper part of the column.

Seeing then that mucin is precipitated by both mineral and vegetable acids, we are at no loss to understand that any test containing one or other of these agents should give a reaction with normal urine. The acidulated brine contains hydrochloric acid, the tungstate of soda and potassio mercuric iodide require the addition of either citric or acetic acid before they act as albumen-precipitants; and they one and all, by the reaction with mucin, slowly cause, in most, if not all normal urines, a cloudiness more decided than that which results from the action of the acids alone. With picric acid, however, the case is entirely different. In the form of a saturated aqueous solution, and uncombined with any other agent, it is a most delicate albumen-precipitant, but it gives no precipitate in normal urine unless an acid, such as citric or acetic acid, be added to it. This can readily be proved by the following experiment. Take about a drachm of freshly



passed normal urine, and add an equal bulk of picric acid solution. The yellow mixture will remain quite clear, unless, as sometimes though rarely happens, some turbidity results from a deposit of urates, which would be at once removed by heat. Now add a few drops of dilute acetic or citric acid, and the mixture will, in a minute or two, become hazy from precipitated mucin, the haziness occurring much more slowly than the immediate opalescence, which results from the presence of a slight trace of albumen, but, like that, being unchanged by heat.

Another experiment consists in adding acetic or citric acid to normal urine, then, after waiting a minute or two to complete the coagulation of the mucin, passing the urine through a filter and adding picric acid to the filtrate; when the mixture will remain quite free from turbidity. I have tested many hundred specimens of normal urine with picric acid, and I confidently assert that in such specimens, no precipitate or haziness occurs when unmixed picric acid is used as the test-agent; and it may be that the different results with this test obtained by Dr. Roberts are due to his having added acetic or citric acid to the picric acid in his experiments. The only precipitates other than albuminous which may result from picric acid, employed alone, are urates which rarely occur, except when the mixture is allowed to stand for some time; peptones, which I have met with only twice in as many years; and vegetable alkaloids, such as quinine, when large doses are being taken. These all differ from an albuminous precipitate in the fact that they are readily and completely redissolved by heat, while they may be distinguished from each other by the microscope. (See the author's lectures on "Albumen and Sugar Testing," p. 11, Smith, Elder & Co.)

It appears, therefore, from very numerous and careful observations, that albumen is the only substance found in the urine which gives with picric acid a precipitate insoluble by heat.

The difference, then, between picric acid and the other new tests for albumen is this—that picric acid, unmixed with other reagents, while it is a most sensitive and trustworthy test for albumen, gives no reaction with mucin. On the other hand, the potassio-mercuric iodide, tungstate of soda, and brine, do not precipitate albumen, unless when combined with an acid; and this combination gives a reaction with mucin, which is not distinguishable from a minute trace of albumen.

I have been in the habit of using the potassio-mercuric iodine only

as a check upon the picric acid test, when small quantities of albumen only were present, and, until lately, had not thought of applying it to normal urine. I now find, however, that this test-liquid, when acidulated—as it must be, to act at all—gives a distinct opalescence in most, if not all, normal urines. I find, too, that after the mucin has been removed from normal urine by its coagulation with acetic or citric acid, and subsequent filtration, the addition of the potassium-mercuric iodide to the filtrate causes a decided opalescence, which is probably due to the precipitation of some substance other than mucin in the urine.

In testing urines which contain a mere trace of albumen, it is important to remove any turbidity that would interfere with the process. Urates would be removed by heat, suspended mucus and other particles by filtration. The addition of the picric acid solution to a turbid specimen might give a fallacious appearance of coagulated albumen, when, in fact, there is nothing more than some increased opacity, due to the yellow staining of the suspended particles.

Picric acid is itself sufficiently acid, when added in excess, to dissolve and clear a phosphatic turbidity. In the rare case of the urine being so highly alkaline as to prevent the coagulation of the albumen by an excess of picric acid, the plan is to add sufficient citric or acetic acid to neutralize the alkali, then to filter, and add the picric acid to the filtrate.

It appears, then, that picric acid as a test for albumen is more free from fallacy than any other, not even excepting heat and nitric acid, which Dr. Roberts expresses his determination to fall back upon. Of course, in a doubtful case, no one would neglect to apply more than one test. That picric acid is a more sensitive test than heat and nitric acid is easily proved by taking a highly albuminous specimen and gradually diluting it up to the point where—though these tests fail to detect it—picric acid still gives a distinct reaction.

The main advantages of picric acid as a test for albumen are the following:—It instantly detects a small amount of albumen which nitric acid would indicate only slowly or not at all; while, on the one hand, an insufficient addition of the test does not, as is the case with nitric acid, prevent the subsequent coagulation by heat; neither, on the other hand, does an excess of picric acid redissolve the precipitate, as does an excess of nitric acid. For bedside urinary testing, the portability of the innocuous powder is a great convenience. The fact

that, with caustic potash, it is an infallible qualitative and quantitative test for sugar, may be said to more than double its value as an urinary test. For bedside use, Mr. Hawksley, 357 Oxford Street, makes a waistcoat-pocket test-case, consisting of a test-tube four inches long, in which are packed two smaller tubes, one containing picric acid powder, the other grain-lumps of caustic potash, and also a small spirit lamp. These are enclosed in a metal case, not much larger than a pencil-case.

Another small case contains a nipple-pipette which, amongst other uses, is convenient for conveying urine from the vessel to the test-tube.

The picric acid which is used for sugar-testing should be purified by recrystallization. The commercial samples usually give a red color when boiled with liquor potassæ; and I lately saw an impure sample which not only gave this red color, but the liquid was rendered turbid by fine granules. The impurity was removed by solution and recrystallizations. A simple test of the purity of picric acid for chemical purposes is to boil a mixture of one volume of the saturated solution with half its volume of liquor potassæ. The resulting liquid should be quite pellucid, and of a pale lemon-yellow color, with no red tinge.—*Pharm. Journ. and Trans.*, October, 1884, p. 329.

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RESORCIN.—Recent investigations have demonstrated that the disagreeable side-effects of resorcin, the nausea and vomiting are by no means due to the remedy itself, but to the impurities accompanying it. Since the *resoreinum purissimum vel resublimatum* has been in the German market the reports of reliable authors have accumulated, which prove that resorcin, if pure, is the most reliable remedy for vomiting we probably possess, and not only in adults, but also in children. Besides its prompt effect in this regard, it is said also to stimulate and to strengthen to an extraordinary degree the digestive functions of the stomach and of the upper part of the small intestines.

Dr. Justus Andeer, in Munchen (*Allg. Med. Centr. Zeit.*, July 5, 1884), recommends resorcin in these cases, in doses varying from sixteen to forty-eight grains, and draws the attention of the profession to the effect which the remedy exerts in very large doses, such as employed in anæmia and chlorosis. Symptoms of intoxication set in, and the individual under its influence acts like a drunken person. A good *old red wine* (Bordeaux, Macon, etc.,) acts like a specific; a few glasses of it putting at once an end to the symptoms mentioned. This action of the red wine is probably due to its containing iron in considerable quantities.—*Med. and Surg. Reporter*, September 13.



## MARTYNIA AND ITS HUMBLE SERVANTS.

BY JOSEPH CRAWFORD, PH.G.

*From an Inaugural Essay.*

This subject is chosen to show, not the presence of some powerful alkaloid or other valuable therapeutical principle which I think is wanting, but rather some of the relations existing between plants and insects, and to awaken a deeper interest among students for observing the indigenous *Materia Medica* and the wonderful forms exhibited by plants.

The sciences of Botany and Entomology have been full of delightful interest to their respective students that the idea of connecting the two (in their earlier history) was almost disregarded, but now the one is known to be as dependent on the other for the perfection of its species, as the other is on it for the perpetuation of its species. The *Martynia* has been selected, not as showing these relations to their utmost, but as a common example and full of untiring interest.

It is a native of the Southwestern States, but is cultivated in the eastern section annually for its flowers and fruit, the latter for pickles and condiments of like nature. The species proboscidea is the one under consideration, and about the only one that receives any horticultural attention. It belongs to the natural order Bignoniaceæ, and is commonly called Unicorn Plant, from the resemblance of the curved capsule and prolonged beak (with horny texture) to a horn, and the specific name is consequently easily derived. The genus was named in honor of Professor Martyn, of Cambridge.

The plant is about two or two and one-half feet high, occasionally prostrate from weight of branches and fruit; leaves entire, large, round and heart-shaped, oblique at base, upper alternate, lower on very long petioles, and all nearly horizontally expanded. Inflorescence a large many-flowered raceme; calyx bell-shaped, with five unequal lobes, the upper lobe narrow,  $\frac{3}{8}$  to  $\frac{1}{2}$  inch long; the others are nearly equal. The lower portion of the calyx is split open to base, and subtended on either side near the top by a large fleshy conical bract as long as the calyx, and of the same color, or a little darker. The corolla is gibbous, inflated, about an inch long, or longer, hangs obliquely on a pedicel twice its length; the lobes nearly equal, spreading, about half an inch broad. The lower lobe is somewhat longer and a trifle broader, and furnishes the most characteristic marking as a temptation or solicitation of insect aid that can be found in any order outside of the Orchidaceæ, represented in this section of the United States, and will be described later. The tube of the corolla is spotted with yellow and purple both on the interior and exterior; the lobes have their share also in the same colors, but not so much of the purple dotting. There are four perfect stamens, didynamous, the fifth only partly developed, club-shaped and woolly; the filaments are long, and one or two are twisted. The anthers are regularly two-celled, and rectangular when opened, when they expose the pollen on the surface in four miniature bricks, by the cohesion with the anthers. The filaments diverge in their recurvature, but



always meet, to cast their pollen, in adjacent pairs. The pistil is also recurved, and exerted at all times beyond the stamens; stigma bifid, the upper portion rolled back, and the lower rolled inwards and somewhat longer than the upper.

On account of this arrangement, the anthers overcapped or covered by the stigma, it scarcely receives any pollen by the natural source, but most, if not all, through the agency of insects, in various ways.

One of the largest of its humble servants in this cause is the female of *Bombus virginicus*, which can be seen in early mornings flying from flower to flower seeking the nectariferous secretion. Its size will just admit its entrance into the tube of the corolla, and it must consequently brush its hirsute thorax against the opened anthers, and a quantity of the pollen adhering to it by contact is brushed off on the lower lobe of the stigma of the next flower visited; the stigma of the same flower is not fertilized by its own pollen by this bee, because of its sensitiveness; when the insect brushes against it on entering, it immediately closes in order to retain any pollen accumulated, and remains so for a lapse of time, or until the insect has left the flower.

This bee is one of its best benefactors, as on account of its size it cannot enter the tube of the corolla without touching either the stigma or stamens and deposit pollen obtained from the last visited flower and receive a new supply from the present one; and, aiding fertilization as described, its presence is an assurance of the complete fertilization.

Although this depends principally upon the bulk of the insect, yet a number of these winged friends are small and have each their peculiar mode of assistance.

"Nature abhors perpetual self-fertilization," is true, but she always supplies the deficiency by having the aid of the wind, birds or insects in the distribution of the pollen; the wind for dioecious plants generally, and for small flowers with an interruption or transposition of parts. Those dependent on insects have some special attraction or solicitation for them, generally in a peculiar form of the flower or beautifully bright coloring of the whole or a part of it.

This plant depends on this last entirely; from its dependent position and quiet coloring of the exterior surface of the corolla and calyx, and a great portion of the interior of the corolla, it would be passed unnoticed by the myriads of winged insects constantly passing near, were it not for the beautiful marking on the lower portion of the corolla. It begins at the insertion of the corolla on the receptacle, is prolonged through the tube in brilliant golden lines about the size of the filaments, and terminates on the lower lobe in bright golden splotches, in exact imitation of the stamens discharging their pollen. The quiet pearl hue of the background adds so greatly to the deception that even the instructed are too apt to consider them the essential organs without further investigation.

One of its numerous *small* friends is the *Mellisodes prunosa*, very frequent at all hours of the day and extremely busy; its size and general appearance is similar to that of the worker of *Apis mellifica*, and unobservant individuals are likely to confound them; but they can easily be distinguished by the little triangular white spot on the head, just above the

mouth, and by their seeking separate flowers; the *Apis* scarcely visiting the *Martynia*, while the *Melissodes* crowd the corollas to the verge, so eager are they for the nectar secretion. They are as industrious and persevering as their relative, for frequently can they be seen crowding the whole length of the corolla, waiting patiently for their turn at the fountain of nectar, and one, undisturbed, will remain from 15 to 20 minutes at a single flower. It is only when congregated thus that they are of any service in aiding fertilization, as on account of their size they have easy access to all parts without distributing much pollen; but when a number of them are assembled the advent of a new arrival causes a flutter of excitement momentarily among the little congregation, pollen is detached, and, adhering to portions of their bodies, is transported to the stigmas of other flowers which are thus fertilized.

The *Melissodes* prefers the base of the flower for its exertions, but the genus *Halictus*, represented by a beautiful female, is content with the pollen, and works very industriously at it, letting no small amount fall on the backs of the "waiting congregation" of *Melissodes*, etc., and, these subsequently transporting it to the stigmas of other flowers, cross fertilization is again produced. This insect is much smaller than the preceding, much shyer and a great deal more active, but not as numerous represented.

In describing the plant nothing was said about the viscid glands covering its entire surface, giving it a somewhat glaucous hue, and one unaccustomed to the plant would in all probability, on hasty inspection, rank it as velvety to the touch, but on a more extended investigation the mistake would be clearly shown and the true nature reveal itself by its resinous secretion. Although so numerous, they can scarcely be described without the aid of the microscopical instrument, except that they are of various sizes, the largest about a line in length, rather rigid, composed of from four or six to ten or twelve transparent elongated cells, terminated in a flattened globe (mostly), but when a foreign substance touches the tip a thread-like glutinous mass is drawn out, exhausting the gland in part and causing it to assume another shape. They are more numerous and larger on the under side of leaves, main stem and parts of the inflorescence, while the upper side of the leaves is covered with a shorter kind, nearly free from resin (probably from attrition of elements), and the long curved pods are comparatively free from it.

The office of the glands is at present unknown, but undoubtedly they are of consequence in assimilation to the plant in this wise: from their glutinous nature, small insects meet their fate by passing too near, or, forced by the wind upon them, and struggling, they become still more entrapped, and death relieves them of their misery, and they become disintegrated by unseen forces. Whether or not they are absorbed in the liquid or gaseous form is yet to be ascertained; many writers have approached the subject, but accomplished nothing. Darwin and Mrs. Treat have proved the presence of gastric juice in *Drosera* and *Diomea*; but then the adaptations are dissimilar, these being mobile and the *Martynia* immobile.

It is not altogether unlikely that the odor of the plant assists in the "slaughter of the innocents," by alluring them to it, as it is very offensive to many people having occasion to pass it. From the upper surface of a leaf

taken from the middle of the stem were counted 16 hemipterous and 1 coleopterous, and on the lower surface 112 dipterous and 5 coleopterous insects, insects with a few living aphides, in different stages of development. This is the number from one ordinary leaf, and it is very easily seen that a few of these plants in a garden must necessarily rid it of countless numbers of these, apparently, creatures of detestation, and render man an unseen service of good. Some of these thus caught were too minute to specify, and others comparatively rare; such were a male and female *Halictus*. *Phyllobreta dilaticornis* was very frequent; *Ascogaster basalis* quite numerous, and *Haltica fuscula* was very well represented. It was noticed that the *Halictus*, in its flight to the flowers, frequently came to its death on the glands beneath.

From these few facts we are safe at least in pronouncing *Martynia* an entomophilous plant, an insecticide, and in all probability insectivorous, worthy of considerable attention, more than I have had time to bestow, and from two partial afternoon associations with it.

The investigation of *species* was assisted by Prof. Ezra T. Cresson and Mr. Aaron, of the Academy at Shannonville, Pa.

## VARIETIES.

**CHLORAL HYDRATE AS A VESICANT.**—Dr. A. M. Fauntleroy recommends powdered chloral sprinkled on adhesive plaster and melted by a gentle heat (not more than enough to cause the plaster to adhere to the flesh), it is applied while warm to the part where the blister is wanted; within a few minutes a gentle heat is felt, increasing in intensity for a short time, then gradually easing off, and at the end of about ten minutes the part is free from pain, and effectually blistered. Thus within about ten minutes the work of an old-fashioned blister is accomplished, with many advantages over the latter, (1) rapidity of action, (2) the ease of application, (3) the none-occurrence of strangury, and (4) farther, it may never be taken off to have the blister dressed, but may be allowed to remain until the plaster loosens and comes off itself. The blistered surface in the meanwhile healing kindly.—*Southern Clinic*.

**AMYL NITRITE.**—Dr. Richardson gives the following formula for the administration of amyl nitrite by the mouth: Amyl nitrite, pure, minims xxxvi; ethylic alcohol (sp. gr. 830), drachms vi; glycerin to one and a half ounces. One fluidrachm to be taken in a wineglassful of warm water. In asthma this method is specially recommended.—*Weekly Medical Review*.

**KOLA NUT.**—M. Dujardin-Beaumetz showed a specimen of the fruit of the *Sterculia acuminata*, a tree indigenous to Central Africa, at a recent meeting of the Paris Société de Thérapeutique (Progr. Méd.), and remarked



that analysis showed that it contained a large amount of caffeine, tannic acid, and a little theobromine. Naval surgeons had employed it with success in the chronic diarrhoeas of hot climates, and its use was likewise indicated in cardiac affections and in the cachexiæ. He himself had seen good effects from it in these cases, given either in the form of an infusion of the roasted nut, as an elixir, or in the shape of chocolate. In all these cases it acted as a tonic and astringent.—*Med. Bulletin*, October, 1884.

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USE OF NAPHTALIN.—Professor Rossbach, in Jena, has observed that in all catarrhal conditions of the intestines, and in chronic intestinal affections, naphthalin is a specific, and invariably causes the disappearance of the malady. He never noticed any bad side or after-effect, and most of the naphthalin passed off again by the bowels, while a small percentage of it, changed to phenol, made its appearance in the urine. The usual dose for adults is from eight to ten grains daily. The remedy has also a very favorable influence upon vesical catarrh, the purulent discharge at once ceasing, and he attributes its beneficial effect in such cases to the changing of naphthalin to phenol in the urine. Patients generally do not object to the taste of naphthalin, purified by sublimation; as a corrigens for its odor, a few drops of oil of bergamot is recommended.—*Deutsch. Med. Zeit.*

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BROMIDE OF AMMONIUM is comparatively little used except in association with the other bromides and with hydrobromic acid, and modern experience seems to indicate that it is perhaps not less used than formerly, but that in the increasing use of bromides this does not increase as rapidly as the potassium salt. The taste is much more disagreeable than that of the potassium salt, and becomes more disagreeable by prolonged use, and it is more irritant and less acceptable to the stomach; in common with salines in general, it is best given in iced water. The dose is that quantity which will yield the desired degree of bromine effect. In some persons this may be ten grains three times a day, and in others fifty grains. For its full effect bromism must be induced, and the dose be then diminished so as to fall just short of that. For such use about twenty grains three times a day will be about the proper dose to begin with. Its principal use is in the treatment of epilepsy, but it is probable that the potassium salt is better adapted to this purpose.—*Amer. Practitioner*, November, 1884.

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HYPODERMIC INJECTION OF OSMIC ACID.—A. Eulenburg reports on twelve cases of hypodermic injection of osmic acid. The amount he injects at a time is 0.05 gram. The solution used is never greater than 1 per cent., but the dose is repeated sometimes as often as fourteen times. It is desirable to pass the injection as nearly as possible in the immediate neighborhood of the affected nerve. Of the twelve cases of different forms of neuralgia, three were cured, four improved. The other cases were of long standing and were not improved.—*Weekly Med. Review*, September 20, 1884.

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CHLORIDE OF METHYLENE.—In a memoir published a few months since Messrs. Regnaud and Villejean gave their reasons, based upon chemical



analysis, for believing that the product at that time supplied to surgeons under the name of chloride of methylene was often, if not always, a simple mixture of chloroform and methylic alcohol. Subsequently, with a view of studying the subject physiologically, they prepared what they claimed to be pure chloride of methylene, the action of which was tested on dogs and other animals, comparative experiments being also carried out with chloroform. They report in the "Pharmaceutical Journal" that the results strengthened their previous belief and that the misnamed mixtures owe their properties to chloroform only. The physiological action of chloride of methylene was found to differ entirely from that of chloroform, with the exception that both compounds produced unconsciousness. The symptoms resulting from the inhalation of chloride of methylene were so constant, and of such an alarming character, that the authors think its employment as an anæsthetic agent during surgical operations is out of the question, and they doubt whether it has ever been so employed. Clonic contractions of muscles, of epileptiform and choreiform kind, were the alarming symptoms observed, but such movements are by no means confined to one member of the chlorine series of anæsthetics.—*Therapeutic Gazette*.

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FLUORIDE OF QUININE FOR ENLARGED SPLEEN.—Fluoride of quinine has recently been recommended by Dr. Weddell, of Calcutta, in the treatment of enlarged spleen. He has investigated the action of fluoric acid and the fluorides, and has come to the conclusion that in cases of chronically enlarged spleens of malarial origin the effects obtained are often very striking. In very small doses the fluorides have produced marked benefit in cases of rickets and other diseases associated with malnutrition of the osseous system. Of the salts of fluoric acid, Dr. Weddell considers those of quinine or quinetum (*i. e.*, of the mixed cinchona alkaloids) to be the best.—*Med. and Surg. Reporter*.

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SALICYLATE OF ATROPINE.—From the "Lancet," September 27, 1884, we learn that salicylate of atropine appears to be in some quarters displacing the sulphate. Frederici has prepared the neutral salt by dissolving the atropine (twenty-three parts) with the aid of gentle heat in a suitable quantity of pure alcohol, and then adding the salicylic acid gradually to complete neutralization (eighteen parts) the solution being carefully tested with litmus paper during the operation. The liquid is then evaporated in a water-bath to a gelatinous consistence, the mass assuming an amber color, and the drying is finished in a sand-bath or drying-closet. The compound deliquesces quickly when exposed to the atmosphere, but is said to keep well if properly preserved, though the solution is very unstable.—*Med. and Surg. Reporter*.

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HELENIN crystallizes in four-sided prisms, insoluble in water, but soluble in ether and alcohol; it has a yellow color, melts at 72°, and boils at 140° C. (284 F.); its formula is  $C^{21}H^{26}O^3$ . Helenin has been extensively employed in the general hospital of Madrid in the treatment of tuberculosis, chronic

broncho-pneumonia, and whooping-cough. Considerable benefit has been obtained in early phthisis, and striking results in chronic bronchitis, and especially in whooping-cough. In all cases helenin diminished the attacks of cough, and relieved the dyspnoea and pains of the chest, without causing any symptoms of narcotism. The expectoration diminishes and becomes almost gelatinous. It also has a decided tonic action in the digestive organs, and improves markedly the appetite in phthisis.—*Quarterly Therapeutic Review*.

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**ASEPTOL.**—A phenol compound, termed orthoxyphenylsulphurous acid, has been recently introduced into therapeutics under the name of "aseptol," this title having been given to it on account of its remarkable germicide qualities, which excel those of carbolic and salicylic acids. Aseptol is an amber-colored fluid, of a density 1,400; it has a slight odor, but is more pleasant to the smell and is less poisonous than carbolic acid. Last November Drs. Leroy and Van den Shrieck, of Antwerp, studied the therapeutic applications of aseptol, and reported most satisfactory results as an antiseptic. It has the following advantages over antiseptics in common use:

1. It is very soluble in water.
  2. It is very slightly caustic.
  3. It is free from irritative qualities, and may be applied for a long time to the skin, the eyes, the bladder, etc.
  4. Finally, its slight toxicity, which permits its use internally in considerable doses, and also the application of concentrated solutions in diphtheritic pharyngitis and laryngitis.—*La France Médicale*; *Med. Times*, Nov. 1, 1884.
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**SANTONIN.**—Kuechenmeister has shown that lumbrici lived in a mixture of albumen, santonin and water, but they succumbed in a few minutes in an oily mixture containing santonin. Powder or troches are not a good way of administration, for the santonin is then mostly absorbed in the stomach. The only rational preparation is an emulsion which is slowly absorbed in the intestines. In any other mode it has a toxic effect with many, but given with castor oil it is not disagreeable, and very efficient.—*Revue de Science Medicale*.

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**FLUID EXTRACT OF GREEN COFFEE.**—Like tea, coffee can also be readily obtained of excellent quality and uniform prices.

In the trials of the fluid extract of coffee an amount containing 1.95 grains of caffeine produced the same results as three grains of pure caffeine or two grains of caffeine as it exists in tea, and about 2.58 grains as it exists in guarana.

The method of comparing these agents by a physiological test is not offered by Dr. Squibb as "a method of precision or as worthy of any great trust, and it is especially guarded against being received for more than it is worth. It is only a practical plan, carried out with much pains and care

for close guessing at results, but the observations are fairly consistent among themselves, and therefore place the agents in a true relation to each other."

This would seem to be too modest a statement of their worth, and the profession are certainly indebted to him for a better acquaintance with the composition and comparative merits of some much-used drugs.—*Dr. F. Minot, in the Boston Medical and Surgical Journal; Louisv. Med. News.*

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## MINUTES OF THE PHARMACEUTICAL MEETING.

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PHILADELPHIA, November 18, 1884.

The second regular pharmaceutical meeting was held this day, Professor Henry Trimble being called to the chair, in the absence of the president.

The minutes of the last pharmaceutical meeting were read, and there being no corrections needed, they were approved.

The Report of the Smithsonian Institution for the year 1882 was presented to the College, as well as the Report of the Commissioner of Education for 1882 and 1883, which have both been acknowledged by the librarian.

For some time past a paragraph has been printed in various medical journals recommending *carbonate of titanium* for the relief of dysmenorrhœa; Mr. Bullock stated that it was very doubtful if such a compound could exist, and that it could not be obtained for commercial uses was now well ascertained; calls having been made for it, samples of the so-called carbonate of titanium were obtained and subjected to analysis, which proved it to be simply carbonate and oxide of iron largely mixed with silica; this was also the result of an examination conducted by Prof. Trimble.

Mr. Bullock also called attention to a specimen of *native platinum* obtained from the black sand from the rutile in southern Oregon, where it exists in considerable quantities; these sands are composed largely of magnetic oxide of iron, titanium, osmium and iridium; in the sample which he exhibited about four ounces of the platinum mixed with the native alloy of osmium and iridium has been separated simply by washing.

Among the specimens exhibited was one of *native green oxide of nickel*, also from Oregon; the vein from which it was taken being about eighteen inches wide and lying between walls of sulphate of baryta; the value of such an ore can be best estimated from the fact that it contains about fifteen per cent. of nickel, while the ordinary ores used for the supply of commerce contains but about half of one per cent.

Attention was called to a specimen of *fluid extract of belladonna* prepared from recently dried root of very fine quality; the sides and bottom of the bottle were studded with numerous crystals; these were removed, washed and dissolved in water, but gave no reaction with Mayer's test for alkaloids; when treated with Fehling's test for sugar, gave no reaction; the solution was then boiled with a few drops of nitric acid and again tested by Fehling's test, and gave a copious precipitate evidencing the presence of glucose.



By these reactions Mr. Bullock determined the crystals to be cane sugar uncontaminated with glucose.

Dr. F. L. Slocum exhibited some specimens from Dr. H. W. Jayne's chemical laboratory. Among them were two of *aniline*, one of remarkable purity having the boiling point of  $181.7^{\circ}$  to  $182^{\circ}$ , and a specific gravity of 1.022, phosphorus trichloride and phosphorus pentachloride.

Prof. Trimble alluded to some *petroleum spirit* which Dr. Slocum had prepared for him, but further than to state that it was prepared by use of strong nitric acid he could not say, as the experiments he was prosecuting were still unfinished, but when results were ascertained he would present a paper upon the subject.

A new pattern of *Gas Stove* by W. F. Shaw, of Boston, who has been engaged in this industry for twenty-five years, was exhibited by Mr. Bullock; the advantages it possesses are the solidity of the stand, the addition of an inverted cone, which is placed over the centre of the flame, causes the gas to mix thoroughly with the column of heated air and secures a perfect combustion.

As there was no other business, the meeting, on motion, adjourned.

THOS. S. WIEGAND, Registrar.

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## PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

THE CALIFORNIA COLLEGE OF PHARMACY held its twelfth annual commencement in Metropolitan Hall, San Francisco, on the evening of Nov. 13th, when President Reid, of the University of California, conferred the degree of Ph.G. upon the following successful students:

Josephine E. Barbat, *Apium Graveolens*.  
Henry A. Ball, *Analysis of Withoit Mineral Water*.  
Henry E. D. Besthorn, *Apium Officinarium*.  
William H. Dick, *Chamaecyparis Lawsoniana*.  
Frederic L. Krause, *Aqua Menthae Piperitæ*.  
Albert L. Leber, *Euphorbia Ocellata*.  
Charles G. Levison, *Euphorbia Pilulifera*.  
George W. Loehr, *Qualitative and Quantitative Tests of Drugs*.  
James G. Munson, *Volumetric Tests of Arsenical Preparations*.  
Thomas S. Newby, *Chenopodium Californicum*.  
George Oberdeener, *Rumex Hymenosepalus*.  
Andrew D. Walsh, *Malva Rotundifolia*.  
William B. Whitney, *Euphorbia Eremocarpus*.

Addresses were made by Dr. A. L. Lengfeld, Vice-President of the College, and by S. P. Sprecher, D. D., and the valedictory addresses were delivered by Prof. W. M. Searby and by H. A. Ball, Ph.G. The first prize (gold medal) was carried off by G. Oberdeener, the second prize (5 volumes of Roscoe and Schorlemmer's Chemistry) by A. L. Leber, and the junior prize (lecture tickets to senior course) by Chas. J. Schmelz.

The exercises were enlivened by music, and, according to the programme, no flowers were distributed.

We notice that the lectures extend through nine months, commencing



in February and closing towards the end of October. The College graduated for the first time a lady, who is the fourth female graduate in pharmacy in the United States, one lady having previously earned this honor in New York and two in Philadelphia.

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MARYLAND COLLEGE OF PHARMACY.—At the monthly meeting, Nov. 20th, Prof. Chas. Caspari read an interesting paper on new and rare pharmaceutical preparations and chemicals, and exhibited samples of extract of stramonium seed and boro-glycerin prepared by him.

In describing some points of interest in pharmaceutical manipulations, quite a spirited debate ensued, in which Messrs. W. S. Thompson L. Dohme, A. P. Sharp and others participated.

Mr. Thompson, in speaking of *powdered ergot*, recited the past experience of pharmacists before the days of fluid extracts, when frequently the the dispenser was summoned by the night bell to freshly powder some grain ergot for that class of cases requiring it, so often to occur in the still hours of the night. He gave as his opinion, based upon observation and experience, that the deterioration of powdered ergot is due to moisture, and if this be dispelled by drying, the powder will remain unimpaired for a long time, if kept in a securely stopped bottle.

Mr. A. P. Sharp gave a brief description of his observations in vegetable physiology, as to how plants grow and receive their nourishment; the formation of chlorophyll, etc. Some of his views were combatted by Mr. L. Dohme and Prof. Caspari.

Prof. Caspari exhibited a *percolator*, and after some general remarks on percolators and percolation, on motion, a committee was appointed, with Prof. Caspari as chairman, to inquire into and report upon the relative merits of percolators.

A committee was also appointed to consider the propriety of adopting the New York and Brooklyn Formulary by the College for the use of its members.

Mr. J. F. Hancock addressed the meeting on "*Pharmacists as Retail Liquor Dealers*," protesting against the demands of the State requiring pharmacists to register as such dealers under the law, by procuring the retail liquor dealer's license. He called upon the College to defend the good name of pharmacy by the appointment of a committee to wait upon the Sheriff and State Attorney, with the view of having pharmacists excused, except in cases where liquor is retailed by the glass. If the trader's license will not allow pharmacists to sell alcohol for uses in the arts, and alcoholic liquors as medicines, the College should make the effort to have the law so amended or added to as to issue a pharmaceutical license granting these privileges, because it is impossible to conduct a pharmaceutical business without these agents. The medical profession regard alcohol and fermented liquors as being medicinal, and in some cases they are regarded as poisons; therefore they should be dispensed by pharmacists only for medical uses, and under such restrictions as other dangerous remedies are sold. The Government license or tax was characterized as an unjust and arbitrary war measure, greatly to the dishonor of pharmacy,

and largely responsible for the dram business done by some pharmacists. He has no sympathy or respect for that class known as "Soda Whiskey Pharmacists," who in addition to the liquor dealer license should be required also to display a sign on the outside front of the establishment, advertising that department of trade, so demoralizing to pharmacy and baneful to domestic happiness.

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## EDITORIAL DEPARTMENT.

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THE VENDING OF NOSTRUMS.—The following letter has been received :

MR. EDITOR :—At the recent meeting of the National Wholesale Druggists' Association held in St. Louis, the attendance being very large, perhaps no subject discussed gave rise to more, or as much attention and debate as "The Champion Plan." It is hardly worth while to state what this plan is, as the readers of the JOURNAL all know it is an arrangement entered into between the manufacturer of proprietary medicines and the retailer to secure to the latter the full retail price of such goods. I have nothing to say of the "plan," whether I think it wise or unwise, but what I do want to say is this, Does it not derogate from the dignity of the profession to have pharmacists take so much interest in the sale of the thousands of nostrums, secret remedies, with which the market is now flooded?

There were present at this convention of wholesale druggists a very respectable delegation from the "National Retail Druggists' Association," educated men in their profession, some at least prominent members of the American Pharmaceutical Association, and it did appear to the writer that these gentlemen—as pharmacists—were out of place in urging so strenuously the adoption of *any* measure relating to *quack* medicines.

One might have supposed, in listening to their long-continued and eloquent efforts, that the chief part of the business of the modern apothecary consisted in buying and selling proprietary remedies, secret preparations, of which they know nothing beyond the printed name, accompanied by certificates of those who had been miraculously cured by their use.

It strikes the writer that, in the course pursued by these gentlemen, the public would be justified in looking upon their action as an *endorsement* of the importance and efficiency of the nostrums with which the country is flooded at the present time. I may be considered old foggy in saying that I have always supposed that the principal tendency of a sound pharmaceutical education was to discourage and, if possible, suppress all quackery and quack preparations.

I cannot help feeling that the worthy gentlemen who participated in the debates on the subject in the late convention at St. Louis forgot for the moment their "high calling" as members of a truly honorable profession, and lost dignity in asking the convention to endorse as legitimate the very articles against which they should set their faces.

Oh for a return to the good old days of past years, when "patent medicines" comprised less than a dozen articles, and even these were handled with a sort of feeling that they were contraband to the profession of a respectable apothecary! Has it come to this—that all the years of hard study, and attendance upon lecture after lecture, the preparation of a carefully digested and highly elaborate thesis, after months of toil, a long-continued brain-torturing examination, and the final graduation, and obtaining of the coveted "parchment," is all to end in handing to your customer some miserable quackery for which you must be sure to obtain the highest

possible price? Why, any peanut seller on the street corner could do this as well.

(Signed)

ROBERT SHOEMAKER.

PHILADELPHIA, *November, 1884.*

The above letter needs no comments from us ; it expresses, substantially, the views which have been advocated by this Journal during the past fifty-six years. Although the public will naturally look to the drug store for supplying them with what they regard as " medicines "—nostrums, in all their various forms, are no part of pharmacy ; their buying and selling is a purely commercial transaction, which as such, is not degrading to pharmacy, but is apt to have this effect if the pharmacist identifies himself with these nostrums, and becomes the advertising agent for such preparations, and, by the distribution of circulars, almanacs, etc., the recommender of specifics and cure-alls. The legitimate province of pharmacy is the preparation and dispensing of medicines ; but he who measures or weighs out only what he has purchased, wherein does he differ from a common dealer? As to nostrums and secret medicines, the American Pharmaceutical Association, from its very inception, has taken a decided stand against them, and during its early history the tendency of American pharmacy pointed towards the endeavor of ridding itself of an evil which, unchecked, would necessarily result in the degradation, instead of the elevation of pharmacy ; the evil had to be tolerated, but it was not petted. It would doubtless conduce to the best interests of the public if the vending of nostrums could be confined to properly educated pharmacists, provided that the latter would not lend a helping hand towards increasing sales which—no matter what pecuniary profit they may temporarily afford—will react to the disadvantage of pharmacy. But it must be remembered that the purchasing and selling of nostrums requires neither knowledge nor skill, and merely enough experience for discerning which will sell best and at the same time afford the largest profit. Any shrewd business man may therefore become the purveyor of ready-made medicines, and entering the trade from a purely mercantile view, and without being able to appreciate the dangers arising from an indiscriminate use of his wares, is more likely to make a business success of such a venture than the conscientious pharmacist who is not willing to shoulder responsibilities against his better judgment, based upon education, experience and knowledge. Such and similar considerations may render it desirable for pharmacists to retain in their hands a trade which in itself is inimical to their profession, because it makes them mere middle-men, or distributors instead of producers.

Much has been said about the encroachment of the pharmacist's domain by traders ; but the other side of the question should not be overlooked. Of the thousand and one fancy articles frequently kept for sale by pharmacists, very few only are used for their medicinal properties or can be claimed to possess such. In many stores exposing a sign with the inscription " Pharmacy," a more or less lucrative business is carried on in cigars, liquors and other commodities which are not used as medicines and are generally sold by other tradesmen. The pharmacist is therefore an invader as well as the sufferer from the invasion by others.



Whether the Campion plan or any other plan devised with a view of keeping up the profit from the retailing of patent medicines be successful or not, we repeat that the latter, if their sale be confined to conscientious and discreet pharmacists, could be stripped of much of the harm, which their unrestricted use is sure to produce. But a professional benefit will never be derived from the handling of nostrums; it is sure to follow, however, if pharmacists will again turn their attention to producing that which they should produce, viz., all pharmaceutical preparations and as many chemicals as their facilities will admit of.

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MONUMENT TO THE MEMORY OF JEAN BAPTISTE DUMAS.—A committee has been organized in Paris in the Palais de l'Institut de France, with the object of collecting contributions for the purpose of erecting a statue of Dumas in Alais, his native town. M. Pasteur has been chosen president, and among the members are the venerable Chevreul, H. Milne-Edwards, Boussingault and many others whose names are well known in science. The committee has also members in most European and in three American countries, those for the United States being Prof. Gibbs and Crafts.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

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*Der Kaffee in seinen Beziehungen zum Leben. Für Haus und Familie und für Gebildete aller Stände geschildert von Dr. H. Böhnke-Reich.* Berlin und Leipzig: Fr. Thiel, 1884. 8vo, pp. 224.

We have noticed the first edition of this work in the JOURNAL for 1875, page 575, and have given there a brief synopsis of the contents of that pamphlet which contained sixty-five pages of text. The one now before us has grown to nearly four times the original size, and may be regarded as a well-performed amplification of the original sketch, combining the interest of the latter with entertaining and often humorous descriptions, narratives and quotations from old and new authors, among them, for instance, Mark Twain's account of the manner in which the beverage is prepared and served in Germany. But the little work is not only entertaining, it is also instructive, and there is scarcely a detail connected with the commercial or scientific history of coffee, which is not more or less fully discussed in this monograph. While it deserves to be read by cultivated persons in general, its appearance at the present time is particularly opportune, since two centuries have passed since the introduction of coffee in Western Europe, which occurred in England after 1650, in Vienna in 1685, in Regensburg in 1686, etc.

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The Proceedings of the following State Pharmaceutical Associations have been received:

*Indiana.* Held in Evansville, May 13-15, pp. 191. Next meeting at Indianapolis, on the second Tuesday in May. Secretary, J. R. Perry, Indianapolis.

*Kentucky.* Held in Louisville, May 21, 22, pp. 99. Next meeting at



Danville, on the third Wednesday in May. Corresponding Secretary, H. W. Evans, Danville.

*Massachusetts.* Held in Lowell, June 4, 5, pp. 250. Next meeting in Pittsfield, on the first Wednesday in June. Local Secretary, J. H. Manning, Pittsfield.

*Missouri.* Held at Sweet Springs, Brownsville, pp. 66. Next meeting at Sweet Springs, on the fourth Tuesday in June. Local Secretary, J. J. Thorn, Brownsville.

*New Jersey.* Held in Asbury Park, May 21, 22, pp. 64. Next meeting in Camden, on the third Wednesday in May. Chairman of Local Committee, Martin Goldsmith, Camden.

*New York.* Held in New York City, June 10-12, pp. 226. Next meeting at Saratoga Springs, on the second Tuesday of June. Local Secretary, Charles F. Fish, Saratoga Springs.

*Pennsylvania.* Held in Wilkesbarre, June 3, 4, pp. 232. With an engraving of the late Dr. G. Ross. Next meeting in Erie, on the first Tuesday in June. Chairman of Committee on Exhibits, J. B. Duble, Williamsport.

*Virginia.* Held in Lynchburg, May 20-22, pp. 71. Next meeting in Charlottesville, on the third Tuesday in May. Local Secretary, C. P. Benson, Charlottesville.

*The Development of Chemistry and its Relation to Pharmacy.* By Prof. Frederick B. Power, Madison, Wis.

An address delivered before the Wisconsin Pharmaceutical Association, August 6, 1884.

*Hydrastine.* By Professor F. B. Power.

Read before the American Pharmaceutical Association.

*Reasons for Believing in the Contagiousness of Phthisis.* By W. H. Webb, M.D., Philadelphia.

Read before the Philadelphia County Medical Society, June 11, 1884.

*Transactions of the Louisiana State Medical Society at its Sixth Session, held at Baton Rouge, May 21-23, 1884.* 8vo, pp. 103.

*Questions submitted to the graduating class of the Medical College of Ohio, from 1871-72 to the present time.* Cincinnati: W. H. Scott. 8vo, pp. 50. Price 50 cents.

*Ueber die Verbreitung der Terpentin liefernden Pinus-Arten im Süden der Vereinigten Staaten, und über die Gewinnung und Verarbeitung des Terpentins.* Von Prof. Carl Mohr, Mobile, Ala.

On the distribution in the Southern United States of the species of *Pinus* yielding turpentine, and on the production and manufacture of turpentine.

A valuable contribution on a subject of great economic importance, reprinted from *Pharmaceutische Rundschau*, New York, September, 1884.

*Preliminary list of the Parasitic Fungi of Wisconsin.* By William Trelease, Professor of Botany, University of Wisconsin, Madison.

This list comprises 268 species and gives also the hosts, all having been examined by the author and most of them collected near Madison. A

number of new species are described. An index of the hosts facilitates the use of this carefully prepared list, which is a reprint from the Transactions of the Wisconsin Academy of Sciences, Arts and Letters, vol. vi.

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*Jahresbericht des Vereins Kosmos von Philadelphia, für das Vereinsjahr 1883-84*, 8vo, pp. 99.

Annual Report of the Society "Kosmos" of Philadelphia.

Besides the officers' reports the pamphlet contains the lectures, either in full or abstract, delivered before the Society, and among which may be mentioned the following subjects: The influence of chemistry on the development of industry; the telephone and its inventors; the sculpture of the earth's surface; the human voice; pulmonary consumption; unused forces, etc.

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*One Aspect of the Subject of Medical Examination*, as set forth in the work of the North Carolina Board of Medical Examiners.

From the North Carolina Board of Health.

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*On the Development of Physiological Chemistry and its significance for Medicine*. By Prof. Felix Hoppe-Seyler. Translated by T. Wesley Mills, M. A., M. D., Montreal, Canada.

The address was delivered at the opening of the new institute for physiological chemistry of the imperial University of Strassburg, February 18, 1884. Reprinted from the New York "Medical Journal," Aug. 16 and 23, 1884.

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*Explanation of the Pathology and Therapeutics of the diseases of the nerve centres, especially epilepsy*. By J. McF. Gaston, M. D., Atlanta, Ga. 8vo, pp. 28.

Advance sheets from Transactions of the Georgia Medical Association, 1884.

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*Aiken, S. C., as a Winter Resort*.

Besides a description, etc., of the Highland Park Hotel, the pamphlet contains a treatise on the sanitary qualities of the location and climate of Aiken, by Dr. P. G. Rockwell, and meteorological tables, by Dr. W. H. Geddings.

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*Permanganate of Potassium, its Action and Uses*. By Prof. Roberts Bartholow, M. D.

Reprint from the "Medical News."

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*Action of the Halogen Acids and Ammonia on Lactones*. By L. I. Morris, of Emporia, Kansas.

Inaugural dissertation submitted to the Kaiser Wilhelm University, Strassburg, for the acquisition of the doctorate.

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The following dissertations from the University of Dorpat have been received:

*Vergleichende Untersuchung der Gerbstoffe der Nymphaea alba, Nym. odorata, Nuphar luteum, Nuph. advena, Cuscuta coriaria, Terminalia Chebula und Punica Granatum*. Von Alexander Fridolin. 8vo pp. 94.

Comparative examination of the tannins of the plants named.

*Ueber den Gerbstoff der Castanea vesca.* Von Paul Nass. Pp. 39.

On the tannin of *Castanea vesca*.

*Ueber die Ausscheidung des Strychnins.* Von Peter von Rautenfeld. Pp. 44.

On the excretion of strychnine.

The excretion of the unaltered alkaloid takes place through the urine; it begins soon after the strychnine has been taken, and continues for several days, the duration depending upon the quantity of the poison taken.

*Studien über die Darstellung, Zusammensetzung und Eigenschaften des Sennits (Cathartomannits).* Von Albert Seidel.

Studies upon the Preparation, Composition and Properties of Sennit (Cathartomannit).

## OBITUARY.

GEORGE BENTHAM, the celebrated botanist, died in London, September 10th, in the eighty-fourth year of his life. His most important works are: "Genera Plantarum," for which Sir J. D. Hooker was his co-laborer; "Flora Australiensis," in which he was assisted by Baron von Mueller, and his elaboration of several natural orders in Martius et Eichler's "Flora Brasiliensis," and in De Candolle's "Prodromus." Numerous contributions to the Transactions and the Journal of the Linnæan Society give proof of his well-directed labors in his favorite science.

ADOLF FENNEL died in Cincinnati, September 29th, in his sixty-first year. He was born and educated in Cassel, was apprentice in pharmacy in Eschwege, served as assistant in various parts of Germany and Switzerland, and came to the United States in 1851. Ten years later he established himself in business in Cincinnati, and in 1871 he was elected Professor of Pharmacy in the Cincinnati College of Pharmacy, which chair he afterwards exchanged for that of Chemistry.

CALEB H. NEEDLES died in his native city, Philadelphia, October 10th last, aged 64 years. He graduated from the Philadelphia College of Pharmacy in 1841, writing his thesis on *Juniperus Sabina*, which was published in this Journal, vol. xiii. For many years he conducted the business established by his father on the corner of Twelfth and Race streets. He took considerable interest in the College of Pharmacy and in the Trade Association, of which latter body he was the first President.

SEYMOUR SNOWDEN BURNS, of Minersville, Pa., died in Pottstown, September 25th, of typhoid fever, aged 27 years. He graduated from the Philadelphia College of Pharmacy in 1878.

CURTIS J. BOLLMAN, Ph.G., Class 1884, died at his home, Mansfield, Ohio, November 15th, of typhoid fever, aged 23 years.

# INDEX.

TO VOL. LVI (VOL. XIV, FOURTH SERIES), OF THE  
AMERICAN JOURNAL OF PHARMACY.

	PAGE
<i>Abelmoschus</i> fibres, microscopical characters.....	223
<i>Abies</i> , balsamea, use of bark by the Indians .....	617
<i>Abrus precatorius</i> , caution about use of.....	292
<i>Abuta rufescens</i> , exported from Brazil .....	623
Acetal, hypnotic action of.....	121
Acid benzoic, pure, preparation from urine.....	91
boric, poisonous effects of.....	21, 597
carbolic, estimation of phenol in.....	482
use of, in yellow fever.....	322
cinnamic, in dragon's blood.....	328
gallic, solution with potassium citrate.....	390
hydrobromic, large doses of.....	365
hydrocyanic, estimation of.....	551
oleic, properties of pure and commercial.....	12
osmic, hypodermic injection of.....	645
phosphoric, fungoid growth in.....	540
strength of.....	572
picric, detection and estimation of .....	212
in iodoform.....	598
pipitzaholic, distribution and properties of.....	185, 193
salicylic, absorption by the skin.....	184
influence on alcoholic fermentation .....	596
injurious as a food preservative.....	121, 268
solubility of, in lard.....	594
Acids, tannic, of oak bark .....	135
vegetable, action on lead and tin .....	115
Aconite root, description and test.....	277
Aconitine for internal administration .....	40
<i>Adrian and Moreaux</i> . Preparation of quassia.....	98
Agaric, white, constituents of.....	373
Agave fibres, microscopical characters.....	223
Albumen, tests for, in urine.....	636
Alcohol, antidotal to strychnine.....	376
tables of percentage and specific gravity.....	71, 251
Alkaloids, belladonna and stramonium, nomenclature of.....	440
cinchona, compound of.....	43, 515, 575
mydriatic, test for (mercuric chloride).....	206
putrefaction, chemical action of.....	158
vegetable, tests for (sodium thioantimoniate).....	150
<i>Alnus viridis</i> , use of bark by the Indians .....	618



Aloe fibres, microscopic characters.....	223
fossil, from the Wealden.....	552
Aloin, preparation and yield from different aloes.....	507
Alstonia scholaris yields gutta jelutong.....	444
Alum, effect of, upon the teeth.....	120
exsiccated, use in intermittent fevers.....	340
Alumni Associations of Colleges of Pharmacy :	
Philadelphia.....	235, 398, 602
Pittsburg.....	344
American Pharmaceutical Association, meeting of.....	300, 393, 399, 536
Ammonium bromide, dose of.....	645
chloride, action upon lead iodide.....	91
valerate, tasteless and odorless solution.....	313
Amyl nitrite, administration of.....	644
Ananas contains mannitol.....	477
Analysis by capillarity.....	508
drop-method of.....	416
Anchietea salutaris, use of, in Brazil.....	626
Angustura bark, alkaloids of.....	375
Antibacterid, composition of.....	196, 597
Antimony and potassium tartrate, valuation of.....	417
Antipyrine, properties of.....	578
Apocynum cannabinum, laticiferous vessels.....	131
hypericifolium, use of, by the Indians.....	620
Aqua calcis, solubility of lime.....	110
chloroformi, preparation and use of.....	165
pruni virginianæ.....	570
Aque medicatæ, preparation of, with calcium phosphate.....	65
Arbutin, diuretic properties of.....	51, 133
Arctium Lappa, use of, in Japan.....	530
Arnaud. Cinchonamine.....	156
Artanthe mollicoma, use of.....	628
Aseptol, composition and use of.....	647
Aspidium, admixtures in male fern.....	573
Aspidosperma Peroba, use of seeds.....	624
Quebracho, crystal sheath of bast fibres.....	129
Atropa Belladonna, see Belladonna.	
Atropine and mydriatic alkaloids, test for (mercuric chloride).....	206
salicylate, preparation of.....	646
Attfield, J. Tin in canned foods.....	269
Occurrence of sugar in tobacco.....	147
<i>Babb, Grace L.</i> Microscopical examination of malt.....	308
Baccharis genistelloides, constituents and use of.....	621
Balto. Chemistry of plants.....	581
Balsam Peru, quality of.....	555
Bambusa puerula, use of, in Japan.....	530
Barber, H. L. Menispermum canadense.....	401
Barium chloride, impurities in.....	9
Barley, analysis of.....	366
Barrett, E. L. and C. H. Wood. Cinchona alkaloids.....	43
Batatas edulis, use in Japan.....	530
Baycuru root, analysis of.....	361
Beekeeping industry in America.....	585
Belladonna alkaloids, nomenclature of.....	440
amount of alkaloids in wild and cultivated.....	549
estimation of alkaloids in.....	550
root, estimation of alkaloids.....	279
Belladonnine, composition of.....	597
Berberine, formula and derivatives of.....	510
Bernheimer, O. Derivatives of berberine.....	510

<i>Berthelot</i> . Thermo-chemistry of haloid salts.....	414
<i>Betula alba</i> , use of the wood of, by the Indians.....	620
<i>Beyer</i> , A. Carvol.....	324
Bismuth breath, so-called (tellurium).....	177
and pepsin, stable solution of.....	353
sodium citropyrobamate, preparation and properties.....	318
subnitrate, use of, as surgical dressing.....	598
<i>Blumea lacera</i> , volatile oil of.....	377
<i>Boa</i> , P. Hippurate of sodium.....	108
<i>Boehmeria nivea</i> fibres, microscopic characters.....	222
Bois piquant, see <i>Xanthoxylum caribæum</i>	
<i>Boldoa fragrans</i> , glucoside from.....	580
Borneol, preparation of, from camphor.....	476
<i>Böhringer C. and Körner</i> . Alkaloids of <i>Angustura</i> bark.....	375
<i>Bradford</i> , S. S. Solution of subacetate of lead as a test for olive oil.....	470
<i>Brassica Rapa</i> , use in Japan.....	530
British Pharmaceutical Conference.....	547
Bromine, detection of, in presence of chlorine.....	321
use of, as a disinfectant.....	590
<i>Brouardel</i> , Prof. Salicylic acid as a food preservative.....	268
<i>Brown</i> , A. E. Impurities in barium chloride.....	9
<i>Brukner</i> , B. Chemical nature of starch grains.....	371
<i>Brunella vulgaris</i> , use of, by the Indians.....	620
<i>Bungener</i> , H. Bitter substance of hops.....	427
☉ Caffeine, action of hydrochloric acid on.....	46
in kola seeds.....	169
Calamus, use of, by the Cree Indians.....	617
Calcium hydrate, solubility in water.....	110
sulphide, use of, in scabies.....	340
California College of Pharmacy.....	649
Pharmaceutical Society.....	125
<i>Calumba de Brasil</i> , origin of.....	628
<i>Canavalia gladiata</i> , use of, in Brazil.....	622
incurva, use of, in Japan.....	530
<i>Canella alba</i> , constituents of bark.....	1
Cannabine tannate, hypnotic action of.....	121
<i>Cannabis indica</i> , poisoning by.....	559
Cantharides, assay of commercial.....	570
Canutillo, see <i>Ephedra</i>	
<i>Canzoneri</i> , F. Thapsia resin.....	325
Caoutchouc, cultivation in Ceylon.....	442
Capillarity, analysis by.....	508
researches on.....	509
Carvol from caraway, dill and mint, chemistry of.....	324
<i>Cascara amarga</i> , anatomy and analysis of.....	330
Castoreum, use of, by the Cree Indians.....	620
<i>Ceanothus americanus</i> , analysis of leaves.....	131
<i>Cedrela velosiana</i> , constituents and uses of.....	625
Cellulose, fermentation of.....	164
manufacture of.....	224
<i>Chapoteaut</i> , P. Glucoside from <i>Boldoa fragrans</i> .....	580
<i>Cheatham</i> , M. V. <i>Xanthium strumarium</i> .....	134
<i>China bicolorata</i> , source of.....	554
Chinese grass fibres, microscopical characters.....	222
Chloral hydrate, compatibility with calomel.....	602
use as a vesicant.....	644
as a purgative.....	492
in hicough.....	598
Chlorine, detection of, in presence of bromine.....	321

Chloroform, anæsthetic value of .....	293
and croton oil for tape worm.....	633
Chlorophyll, constitution of.....	219
preparation of pure.....	216
<i>Chrystel, G.</i> Detection and estimation of trinitrophenol.....	212
Cider as a preventive of stone.....	430
Cimicifuga racemosa, history and constituents.....	459
Cinchona assay, modification of pharmacopœial process.....	545
calisaya, little quinine in bark of .....	573
forests in Bolivia.....	434
Cinchonamine, preparation and salts of.....	156
<i>Claassen, E.</i> , Potassium nitrate crystals from plants.....	365
Syrup of tolu.....	356
<i>Clinch, J. H. M.</i> Ceanothus americanus.....	131
Cloves, adulteration with clove stems and cocoa shells.....	124
Cnicus benedictus yields potassium nitrate.....	365
Cnidocalus neglectus, use of, in Brazil.....	623
Cocaine hydrochlorate, preparation and therapeutics of.....	610
Codeine hydrobromide, formula of.....	374
jelly, preparation and use of.....	574
Cœrulignol from beech tar, chemistry of.....	118
Coffee, physiological action of.....	160
testa of, free from caffeine.....	173, 298
Cola species, seeds of different.....	169
Colleges of Pharmacy, homes for.....	602
Colocasia antiquorum, used as food in Japan.....	530
Comandra livida, use of, by the Indians.....	620
Condenser, hood vapor, description of.....	561
Conophollus Konjak, use of, in Japan.....	530
Convallaria majalis, poisonous effects of.....	294
use of.....	122
Copaifera nitida, use of fruit in Brazil.....	623
Copper, toxic action of .....	293
Coptis trifolia, alkaloids of.....	261
contains starch.....	131
Coriaria ruscifolia, poisonous properties of.....	439
Cork, constituents of.....	240
Cornus sericea, use of, by the Cree Indians.....	618
Cotton, absorbent, process for preparing .....	574
Cotton fibres, microscopical characters.....	222
<i>Cownley, A. J. and B. H. Paul.</i> Homoquinine of cuprea bark. ....	575
<i>Crafts, J. M.</i> Thermometric measurements.....	47
<i>Crawford Joseph</i> , Martynia and its humble servants .....	641
Crescentia Cujute, constituents and use of.....	624
<i>Cripps, R. A.</i> Tincture deposits.....	101
Crotalaria juncea, microscopic appearance of fibres.....	222
Croton erythema, use of, in Brazil .....	627
morifolius, use of leaves and oil of.....	476
Cuprea bark, alkaloid of.....	575
Cuscuta racemosa, use of, in Brazil .....	622
Cusparine, preparation and salts of.....	375
Cyanides, estimation of.....	551
<i>Dalpé, F. A.</i> Baycuru root.....	361
Datura Stramonium, see Stramonium	
<i>Dennett, H. E.</i> , Securing and preserving good dental organs.....	341
Digitalin, separation from digitalein and digitin.....	477
Dioscorea japonica, cultivation in Japan.....	530
Diseases of animals, researches on.....	527
<i>Dobbie, J. J. and G. G. Henderson.</i> Red resins known as dragon's blood.....	327



<i>Daenen, Eg.</i> Observations on Sydenham's laudanum.....	473
<i>Dott, D. B.</i> Codeine hydrobromide.....	374
salts of narcotine.....	152
spirit of nitrous ether.....	385
<i>Dow, J. L.</i> Beekeeping industry in America.....	585
Dragon's blood, varieties and composition.....	327
Drop method of chemical analysis.....	416
Drops, dispensing by.....	177
Drugs, Brazilian, at the Vienna Exhibition.....	621
<i>Duclaux, E.</i> Milk.....	591
<i>Dumas, J. B.</i> Monument to.....	653
<i>Dunstan, W. R.</i> Extract of nux vomica.....	37
suggestions upon tincture of nux vomica.....	31
<i>Dunstan, W. R. and F. Ransom.</i> Estimation of alkaloids in belladonna root.....	279
<i>Dunstan, W. R. and F. W. Short.</i> New glucoside from nux vomica ....	431
Preparation of a standard extract of nux vomica.....	199
Preparation of a standard tincture of nux vomica.....	203
<i>Dyer, W. T. T.</i> Waras.....	423
<i>Dymock, W.</i> Essential oils of blumea and sphæranthus.....	377
<i>Dymond, T. S.</i> Pure benzoic acid from urine.....	94
<b>E</b> ducation, medical, legislation regarding.....	299
Elixir catharticum, formula for.....	471
laxans, formula for.....	471
rhei et magnesiae, formula for.....	471
Emplastrum belladonnæ, caution in using.....	134
iodoformi, formulas for.....	426
Emulsion of copaiba, compound.....	546
<i>England, Jos. W.</i> Medicated waters.....	65
Ephedra trifurcata, use of, in syphilis.....	540
Ergot, powdered, preservation of.....	650
Erythrina Mulungu, use of, in Brazil.....	626
Ether, safety in use of.....	293
<i>Etti, C.</i> Tannins of oak bark.....	135
Eucalyptus globulus, formation of kino in bark.....	124
Euphorbia humistrata, use of, in bowel complaints.....	475
pilulifera, use of, in asthma.....	475
Extracts, fluid, precipitates in.....	449
Extractum belladonnæ fluidum, sugar crystallized from.....	648
caffæe fluidum, use of.....	647
convallariæ majalis fluidum.....	616
glycyrrhizæ, examination of commercial.....	311, 312
malti, valuation of.....	593
nucis vomicæ, percentage of alkaloids in.....	38
standard, process for.....	199
quebracho (loxopterygii) for tanning.....	342
serpentariæ fluidum, remedy for rhus poisoning.....	355
stigmatæ maydis fluidum.....	571
teucris scordii fluidum.....	616
verbenæ hastatæ fluidum.....	616
<i>Falck, M. C.</i> Cimicifuga racemosa.....	459
<i>Falk, J. C.</i> Assay of citrate of iron and quinine.....	316
Fats, examination of.....	122, 479
Feet, fetid and sweating, application for.....	122
Fermentation, alcoholic, influence of salicylic acid.....	596
Ferri et quiniæ citras, assay of commercial.....	316



Ferric chloride, preparation of solution.....	411
ethylate, preparation and properties of.....	323
hydrate, colloidal, preparation and properties of.....	323
lacto-chloride, preparation in scales.....	413
salts, action of, on indigo.....	482
succinate, use of, in biliary colic.....	100
Fibres, vegetable, microscopic characters of.....	222
<i>Filchne</i> , Kairine and kairoline.....	291
Filix mas, see <i>Aspidium</i> .	
Flax fibres, microscopical characters of.....	222
Flentingia congesta yields waras.....	423
rhodocarpa, products of.....	424
Food, artificial, for infants.....	278
canned, presence of tin in.....	269, 550, 580
preserved by boric acid, injurious.....	597
salicylic acid, injurious.....	268
vegetables used in Japan as.....	529
<i>Forbes</i> , J. W. The p and the P.....	531
Formulas, unofficial, action in regard to.....	173
<i>Frey</i> , J. P. <i>Canella alba</i> .....	1
Fungoid growth in aqueous solutions of organic substances.....	540
<b>Galangal</b> , analysis of.....	553
Galipeine, preparation and salts of.....	376
<i>Garcinia Kola</i> yields bitter kola.....	171
<i>Gardenia suaveolens</i> , use in Brazil.....	624
<i>Geissospermum Vellosii</i> , active principle of.....	627
Gelatin, valuation of.....	481
varying properties of.....	480
<i>Gelsemium sempervirens</i> , structural characteristics.....	130
<i>Gerrard</i> , A. W. Crystalline principle from <i>jambosa</i> root.....	210
New reaction and test for atropine and the mydriatic alkaloids.....	206
<i>Gilmour</i> , Wm. Tincture of <i>hyoscyamus</i> .....	284
Glyceritum picis, formula for.....	8
Glycyrrhiza glabra, bundle sheath of bast bundles.....	129
Gold, vegetable (pipitzahoic acid).....	193
<i>Greenish</i> , Thos. Pipitzahoic acid, or vegetable gold.....	193
<i>Grimaux</i> , E. Ferric ethylate and colloidal ferric oxide.....	323
Gross, S. D. Professorship of pathological anatomy.....	447
<i>Groves</i> , T. B. Aconitine for internal administration.....	40
Gutta percha cultivation in Ceylon.....	443
varieties (g. garru, puti, singret, sundek, taban, etc.).....	443, 444
<i>Hager</i> , H. Drop method of chemical analysis.....	416
Hair tonic, Gross's.....	342
<i>Hall</i> , F. P. Action of vegetable acids on lead and tin.....	115
Haloid salts, thermo-chemistry of.....	414
<i>Hart</i> , J. Note on sophisticated saffron.....	328
W. B. Valuation of tartar emetic.....	417
Hazigne, see <i>Symphonia fasciculata</i> .	
<i>Heckel</i> , E. and F. <i>Schlagdenhauffen</i> . Bark of bois piquant.....	579
Some African kolas.....	166
Helenin, use of.....	530, 646
Hemp fibres, microscopical characters of.....	222
<i>Henderson</i> , G. G. and J. J. <i>Dobbie</i> Red resins known as dragon's blood.....	327
<i>Hesse</i> , O. morphine.....	334
Pseudomorphine.....	338
Quinine and homoquinine.....	515
Hibiscus fibres, microscopical characters of.....	223
<i>Hill</i> , J. R. Aqueous mixtures containing potassium chlorate.....	138

<i>Holmes, E. M.</i> Lukrabo, or ta-fung-tze.....	525
Medicinal plants used by the Cree Indians.....	617
Vegetable tallow from Singapore.....	19
Homoquinine, origin and properties of.....	515, 575
Honduras bark, description and analysis.....	330
Hopea spec., seeds yield vegetable tallow.....	20
Hops, bitter substance of.....	427
Hortia arborea, use of, in Brazil.....	626
<i>Houck, C. J.</i> Sanicula marilandica.....	463
O., Sorghum sugar.....	256
<i>Hustwick, T. H.</i> Note on tu-tu ( <i>Coriaria ruscifolia</i> ).....	439
Hydnocarpus anthelmintica source of lukrabo.....	525
Hydrargyrum cum creta, commercial, strength and condition of.....	554
Hymenodietyonine, crystallizable.....	552
Hydrastine, properties, salts and derivatives of.....	539
Hyoscine, constitution of.....	584
Illinois Pharmaceutical Association.....	56
Indiana Pharmaceutical Association.....	343, 653
Indigo, action of ferric salts on.....	482
Infusum digitalis, improved formula for.....	504
granati, preparation of an efficient.....	30
Inhalation, antiseptic.....	598
for catarrh, coryza, asthma, etc.....	492
Iodine, absorption by the skin.....	184
detection of, in presence of chlorine.....	321
Iodoform, detection of picric acid in.....	598
Iowa State Pharmaceutical Association.....	176, 394
Iris versicolor, constituents of.....	616
Jaborandi, substitutions for ( <i>Xanthoxylum</i> ).....	622
<i>Jahns, E.</i> Constituents of white agaric.....	373
Jambosa vulgaris root, crystalline principle from.....	210
<i>Jaworski, W.</i> Relative absorption of neutral salts in the human stomach.....	197
Jequirity, see Abrus precatorius.	
<i>Johnson, George.</i> Tests for albumen in urine.....	636
<i>Jungkunz, W. F.</i> Pomegranate bark.....	137
Juniperus communis, use of, by the Cree Indians.....	618
Jurumbeba, see Solanum insidiosum.	
Jute fibres, microscopical characters of.....	223
Kairine, medical properties of.....	291
Kairoline, medical properties of.....	292
Kaloma angustifolia, use of, by the Cree Indians.....	619
Kamala, amount of ash.....	573
origin, description and varieties of.....	421
<i>Kellner, O.</i> Vegetables used as food in Japan.....	529
<i>Kennedy, G. W.</i> Oleum betule lentæ.....	85
Kentucky Pharmaceutical Association.....	394, 653
<i>Kinsey, A. H.</i> Dispensing by drops.....	181
<i>Kirkby, William.</i> Note on kamala.....	419
<i>Koerner and C. Böhlinger.</i> Alkaloids of angustura bark.....	375
Kola, collection, use, composition and varieties of.....	166
bitter, origin and description of.....	171
nut, use of, in diarrhoea.....	644
<i>Kütz, R.</i> Laserpitin.....	208
Langsdorffia hypogæa, constituents and use of.....	622
Lard, filtration of.....	552

Laserpitin, preparation and chemistry of.....	208
Law, poison, in Denmark.....	573
<i>Lea Sher.</i> Rennet ferment of seeds of <i>Withania</i> .....	161
Lead, action of certain vegetable acids on.....	115
iodide, action of ammonium chloride upon.....	91, 124
<i>Ledum latifolium</i> , use of, by the Cree Indians.....	620
<i>Leonard, I. E.</i> Oleum gaultheriæ.....	264
<i>Light, W. W.</i> Fruit of <i>Opuntia vulgaris</i> .....	3
Lime, chlorinated, composition of.....	9
sulphurated, preparation of.....	555
Linseed, value of crushed and expressed.....	551
Liquor ammonii valerianatis, tasteless and odorless.....	313
calcis, amount of lime dissolved in.....	111
magnesi acetatis, formula for.....	472
<i>Livache, A.</i> Acceleration of the oxidation of drying oils.....	528
<i>Lloyd, J. U.</i> Precipitates in fluid extracts.....	449
Loganin, preparation and properties of.....	431
Logwood as a test for metals.....	214
<i>Lonchocarpus Peckoltii</i> , narcotic properties.....	627
Louisiana Pharmaceutical Association.....	343
<i>Lucuma glycyphloeum</i> , constituents of bark.....	626
<i>Luffa ægyptiaca</i> , constituents and use of.....	6
operculata, use of fruit in Brazil.....	623
<i>Lukrabo</i> , see <i>Hydnocarpus antheimintica</i> .	
<i>Lunge, G. &amp; P. Naef</i> Bleaching powder and analogous compounds... ..	9
<i>Lyons, A. B.</i> Alcohol tables of <i>Hehner</i> and of <i>Pile</i> .....	251
Eulachon oil, substitute for cod liver oil.....	628
Expansion of urine by increase of temperature.....	88
<i>Maben, Th.</i> Solubility of calcic hydrate in water.....	110
<i>Macewan, P.</i> Spiritus ætheris nitrosi, composition in relation to dete- rioration.....	378
Magnesium acetate, preparations of.....	471
carbonate, assays of.....	572
citrate, granulated.....	572
<i>Mahonia</i> (papagaio), use in Brazil.....	624
<i>Maisch, Henry C. C.</i> Action of ammonium chloride upon lead iodide. ..	91
Stearopten of oil of patchouly.....	84
<i>Maisch, J. M.</i> Chemical and Pharmacognostical notes.....	475
Laboratory notes; abstracts from theses.....	570, 616
Notes on researches on capillarity.....	508
Practical notes.....	597
Malt, analysis of.....	465
manufacture of.....	305
microscopical examination of.....	308
<i>Mangifera indica</i> , use of flowers.....	622
<i>Martynia proboscidea</i> , fertilization by insects.....	641
Maryland College of Pharmacy.....	236, 650
Maryland Pharmaceutical Association.....	343
<i>Massa hydrargyri</i> , commercial, quality of.....	554
Massachusetts College of Pharmacy.....	298
Massachusetts State Pharmaceutical Association.....	394, 654
Matteo camphor, composition and properties of.....	477
<i>McConn, W. J.</i> Precipitate from tincture of sanguinaria.....	505
Medicines, ready made.....	558, 652
<i>Menispermum canadense</i> , histology and analysis of.....	401
Menispermæ, reactions of.....	403
Menthol, Japanese and American, comparison of.....	406
use of.....	503
Mercurous iodide, yellow color of.....	546
Mercuric chloride, use of, in gonorrhœa.....	120



Methylene chloride, alarming symptoms from use of.....	645
Metals, logwood as a test for.....	214
Michigan State Pharmaceutical Association.....	176
Milk, albuminoids and other constituents.....	591
condensed, unsuited for children's food.....	278
Mississippi State Pharmaceutical Association.....	395
Missouri State Pharmaceutical Association.....	239, 395, 654
Mixture, antiseptic, for inhalation.....	598
Moerk, F. A. Analysis of barley.....	366
Analysis of malt.....	465
Malt and malting.....	305
Mohr, Charles. Pipitzahoic acid in the Perezias.....	185
Monesia bark, constituents of.....	626
Moreaux and Adrian. Preparation of quassia.....	98
Morphine, combination of, with acids in opium.....	198
derivatives and constitution of.....	334
estimation of.....	634
Musa textilis, microscopic appearance of fibres.....	223
Mylitta australis, a gigantic truffle.....	553
Naef P. and G. Lunge. Bleaching powder.....	9
Napelline, use of, in neuralgia.....	45
Naphthalin, use of, in frost bites.....	51
use of, in intestinal catarrh.....	645
Naphthol, medicinal use and value of.....	27
Narcotine, salts of.....	152
National Retail Druggists' Association.....	399
Nebraska Pharmaceutical Association.....	343
New Hampshire Pharmaceutical Association.....	560
New Jersey Pharmaceutical Association.....	343, 654
New York College of Pharmacy.....	235
State Pharmaceutical Association.....	395, 654
Neynaber, A. F. W., Sr. Acetate of magnesium.....	471
Nickel oxide, native, from Oregon.....	648
Nicotine antidotal to strychnine.....	376
estimation of.....	497
Nostrums, vending of.....	651
Nux vomica, chemistry of.....	550
glucoside (loganin) from.....	431
use of, as a galactagogue.....	492
Oak bark, chemistry of tannins of.....	135
Obituaries—Bentham, George, 656	Gross, Samuel D., 352, 447
Bollman, C. J., 656	Howard, John Eliot, 57, 123
Bridges, Robert, 241, 299	James, Samuel W., 123
Burns, S. S., 654	Lehlbach, Paul F., 400
Collins, Thos. S., 123	Mackenson, A. F., 128
Conrath, Frank, 448	Milleman, Phil. L., 400
Courtney, S. W., 123	Needles Caleb H., 656
Dumas, J. B. A., 351, 653	Price, John B., 400
Engelmann, George, 352	Smith, Ambrose, 600
Falkenberg, B., 128	Squire, Peter, 400
Fennel, Adolf, 656	Stockton, W. W., 400, 448
Goodyear, John S., 443	Wurtz, C. A., 352
Oenothera biennis yields potassium nitrate.....	365
Ohio Pharmacy law.....	238
State Pharmaceutical Association.....	396
Oil betula lenta, distillation and composition of.....	85, 124
caraway, carvol from.....	324
cod liver, amount of iodine in.....	582



Oil, croton and chloroform for tapeworms.....	633
purgative principle of.....	22
vesicating principle of.....	23
dill, carvol from.....	324
eulachon, origin, use and constituents of.....	628
gaultheria, artificial.....	546
composition and properties.....	265
manufacture of.....	264
limes, difference between distilled and ecuelled.....	632
mint ( <i>M. crispa</i> ), carvol from.....	324
neroli, commercial varieties of.....	124
olive, lead subacetate as a test for.....	470
production in Tuscany.....	391
patchouly, physical properties of stearopten of.....	84
peppermint, stearopten of.....	345
turpentine, prophylactic use in infectious diseases.....	293
Oils drying, acceleration of the oxidation of.....	528
volatile, properties of colored portion of.....	553
solubility of, in water.....	125
Olibanum, solubility in oil of turpentine.....	53
Opium, acids combined with morphine in.....	198
assays, comparison of processes.....	539
morphimetric processes.....	634
Oxalis violacea, use of, in Brazil.....	627
Oysters, amount of iodine in.....	583
p and P, (pharmacist and public).....	531
Pachira (castanha), use of.....	622
<i>Palm, R.</i> Tests for vegetable alkaloids.....	150
<i>Panicum italicum</i> , use of, in Japan.....	530
Paraldehyd, hypnotic action of.....	52, 121
<i>Pasteur.</i> Researches on the diseases of animals.....	527
<i>Pastrovich, P.</i> Ccerulignol, Reichenbach's oxidizing principle.....	118
<i>Paul, B. H., and A. J. Cownley.</i> Homoquinine of cuprea bark.....	575
Pennsylvania Pharmaceutical Association.....	396, 654
Pepsau, a kind of pepsin.....	545
Pepsin and bismuth, stable solution of.....	355
soluble and latent.....	344
Peptone, presence of, in urine.....	292
Percolation, simultaneous fractional.....	543
Perculators, standard dimensions for.....	541
Perezia, distribution of species of, and presence of pipitzaholic acid in..	185
<i>Perger, von.</i> Estimation of morphine in opium.....	634
<i>Pettigrew, H. P.</i> Composition of oil of gaultheria.....	265
Pharmaceutical preparations, copper in.....	555
of manufacturers, ordered by physicians.....	546
standardizing of.....	552
ready made.....	558, 652
Pharmacists as liquor dealers.....	650
Pharmacopœia, National, proposed.....	173
the first published in the United States.....	483
<i>Phaseolus limatus</i> , poisonous variety of.....	475
<i>radiatus</i> , use of, in Japan.....	530
Phenol, estimation of, in carbolic acid.....	482
Philadelphia College of Pharmacy :	
Class of 1883-1884.....	53
Commencement.....	234
Corresponding members.....	294
Examinations.....	225
preliminary, discussed.....	123

Philadelphia College of Pharmacy :	
Graduating class.....	231, 298
Honorary members.....	294
Minutes of meetings.....	123, 294, 445, 599
Pharmaceutical meetings.....	52, 124, 172, 298, 342, 601, 648
Philadelphia Pharmacy law, opposition to.....	493
Phlox carolina, amount of extract and ash.....	570
Plonium tenax, microscopic characters of fibres.....	223
Phytolacca decandra, constituents of root.....	567
Picramnine in cascara amarga.....	333
<i>Pile, Gust.</i> Percentage and specific gravity of alcohol.....	71
Pilocarpine, action of bromine on.....	478
use of.....	121
Pipmenthol, composition and melting point of.....	406
stearophen of peppermint.....	345
Piptædenia gida, use of, in Brazil.....	625
Pipturus argenteus, microscopic characters of fibres.....	222
Plants, chemistry of.....	581
easily oxidizable constituents of.....	49
medicinal, used by the Cree Indians.....	617
pungent principles of.....	553
Plasters, prevention of brittleness in.....	547
Platinum, native, from Oregon.....	648
<i>Plenge, H. C.</i> Aloin.....	507
<i>Poehl, A.</i> Putrefaction alkaloids.....	158
Poison case, Biroth's.....	545
Poisons prescribed in medicines.....	493, 556
Polyporus officinalis, constituents of.....	373
Pomegranate bark, chemical examination of.....	137
Poplar bark, use of, by the Indians.....	618
Potassium bitartrate, quality of commercial.....	544
bromide, commercial, examination of.....	543
chlorate, danger in use of.....	492
powdered, in mixtures crystallizes.....	139
iodide, incompatibility with quinine.....	340, 598
nitrate prepared from plants.....	365
permanganate, reducing action of paraffins upon.....	436
Potato, origin of the cultivated.....	344
Powder, Seidlitz, composition of.....	553
Powers & Weightman's laboratory, partial destruction by fire of.....	237
<i>Pressler H. and E. Schmidt.</i> Theobromine.....	44
<i>Preston, E., Jr.</i> Root of Phytolacca decandra.....	567
Protium heptaphyllum, use of fruit in Brazil.....	623
Prunus virginiana, use of, by the Cree Indians.....	620
Pseudomorphine, composition and derivatives of.....	338
Pseudotropine, properties of.....	584
Punica Granatum, efficient preparation of (acidulated infusion).....	30
Putrefaction, chemical action of alkaloids of.....	158
<b>Quassia</b> , preparation, properties and yield of.....	98
Quebracho, crystal sheaths of bast fibres.....	129
effect on heart action.....	51
Quillaia bark, saponin from.....	276
Quinidine, large amount of, in cinchona bark.....	554
Quinine and quinidine, compound of.....	43
fluoride, use of, in enlarged spleen.....	646
modification of, Kerner's test for.....	546
relation to homoquinine.....	515, 575
sulphate, incompatibility with potassium iodide.....	340, 598
<i>Randall, Chas. D.</i> Syrup of hypophosphites with iron.....	357

Ramie fibres, microscopical characters of.....	222
Ransom, F. and W. R. Dunstan. Estimation of alkaloids in belladonna root.....	279
Raphanus sativus, large size of, in Japan.....	530
Reinke, J. Easily oxidizable constituents of plants.....	49
Reisert, Wm. The so-called bismuth breath.....	177
Remijia bicolorata, source of tecamez bark.....	554
ferruginea, constituents and use of .....	627
purdiana contains cinchonamine.....	156
Rennet ferment of seeds of Withania.....	161
Resins, red, known as dragon's blood.....	327
Resorcin, use of.....	526, 640
REVIEWS—Alchemical Notation Chart.....	304
Attfeld, J. Future supply of drugs to the public .....	128
Baird, J. W. Action of heat upon metallic salts.....	448
Beard, G. M. Sexual neurasthenia.....	347
Bentley, R. Student's guide to systematic botany.....	496
Boehnke-Reich. Der Kaffee.....	653
Bruce, J. M. Materia Medica and Therapeutics.....	605
Charles, T. C. Physiological and pathological chemistry.....	606
Chesney, J. P. Shakespeare as a physician.....	347
Druggists' Circular and Chemical Gazette.....	495
Flint, J. M. Materia Medica collection of U. S. Museum.....	56
Flükiger, F. A. Cinchona barks, translated by F. B. Power.....	300
Grundriss der Pharmakognosie.....	398
Gay, H. F. F. Etude micrographique et spectroscopique des teintures.....	349
Gay, F. Monographie locale des Conjugucées.....	349
Greene, W. H. Wurtz's Modern Chemistry.....	346
Hoppe-Seyler. Development of Physiological Chemistry.....	655
Hoppin, S. B. Medical Directory of Philadelphia.....	176
Humpidge, P. S. Kolbe's Inorganic Chemistry.....	496
Huseman and Hilger. Pflanzenstoffe.....	304
Kolbe H. Inorganic Chemistry, translated by Humpidge.....	496
Kügler, K. Ueber das Suberin .....	240
Ladenburg, A. Die kosmischen Konsequenzen der Spectralanalyse	560
Laubenheimer, A. Organische Chemie.....	494
Lillard B. Nelson Price book.....	56
Practical hints and formulas.....	348
Lloyd, J. U. and C. G. Addenda to drugs and medicines.....	608
Drugs and medicines of North America.....	846
Lochman, C. L. Pharmacopœa Germanica. ....	348
Marcy, H. O. Recent advances in Sanitary Science.....	350
Martindale, W. Extra pharmacopœia.....	127, 496
Merrell, A. Digest of Materia Medica and pharmacy.....	55
Meyer, Arthur. Qualitative Analyse.....	345
Millspaugh, C. F. American medicinal plants.....	606
Mohr, Charles. Terpentini liefernde Pinus-Arten .....	655
New York and Brooklyn Formulary of unofficial preparations....	348
Neynaber, A. F. W. Students grammar of Latin .....	350
Oldberg O. and O. A. Wall. Companion to the United States Pharmacopœia .....	301
Oliveira, F. M. de Mello. Materia Medica et Therapeutica brasileira.	240
Parrish, E. Pharmacy, by T. S. Wiegand.....	54
Pharmacopœa Germanica, translated by Lochman.....	348
Physicians' visiting list. ....	608
Poulsen, V. A. Botanical Microchemistry, translated by Trelease..	53
Power F. B. Chemistry and its relation to pharmacy.....	654
The cinchona barks, by F. A. Flükiger.....	300
Pradel P. Le gelsémium sempervirens.....	349
Proceedings of the American Pharmaceutical Association.....	398



REVIEWS—Report of the Pharmacy board of Victoria.....	350
Report of the State Board of Pharmacy of Kentucky.....	350
Robbins, D. C. Drug trade of New York.....	303
Schaer, E. Bericht über Pharmaceutische Produkte.....	239
Simon W. Manual of Chemistry.....	607
Société des Pharmaciens de l'Eure. Bulletin.....	350
Stillé, A. and J. M. Maisch. National Dispensatory.....	495, 603
Trelease, W. Parasitic fungi of Wisconsin.....	655
Poulsen's Botanical Microchemistry.....	53
Tschirch, A. Untersuchungen über das Chlorophyll.....	559
Watts H. Manual of Chemistry.....	53
Whitla, W. Elements of Pharmacy, Materia Medica and Therapeutics.....	303
Wiegand, T. S. Parrish's Treatise on Pharmacy.....	53
Wurtz, A. Modern Chemistry, translated by W. H. Greene.....	346
Yearbook of Pharmacy.....	126
Rhodogen, chromogen of beet-root.....	50
Rhubarb, history and cultivation.....	546
production of, in England.....	549
Rhus toxicodendron, remedy for poisoning by (serpentaria).....	355
Rice, composition of several varieties.....	529
Roa fibres, microscopical characters of.....	222
Rother, R. Bismuth and pepsin.....	353
Ferric chlorides.....	407
Sodio-bismuth citropyroborate.....	318
Tasteless and odorless solution of ammonium valerate.....	313
Rothrock J. T. Laboratory contributions from the University of Pennsylvania.....	129
Rubber, India, see Caoutchouc.	
Ruschenberger, W. S. W. Sketch of the life of Robert Bridges, M. D... ..	241
Saffron, sophisticated (barium and calcium sulphate).....	329
Saint Louis College of Pharmacy.....	236
Salicylage, injurious effect of.....	121
Salts, haloid, thermo-chemistry of.....	414
hydrated, melting point and solubility of.....	512
neutral, relative absorption in the stomach.....	197
Sanicula marilandica, constituents of.....	463
Santonin, administration of.....	647
Saponaria officinalis, saponin from.....	273
Saponin from quillaia, chemistry of.....	276
saponaria, chemistry of.....	273
Sayre, L. E. Preparation and therapeutics of hydrochlorate of cocaine.....	610
Scheffer, E. Estimation of nicotine.....	497
Scheurer-Kestner, A. Notes on the soda industry.....	11
Schiaparelli, C. Saponin from saponaria.....	273
Schlagdenhauffen, F., see Heckel, E.	
Schmidt, E. Action of hydrochloric acid on caffeine.....	46
Berberine and derivatives.....	510
Nomenclature of alkaloids of belladonna and stramonium.....	440
Schmidt, E. and H. Pressler. Theobromine.....	44
Schraeder, L. J. Examination of glycyrrhiza extracts.....	312
Schultz, J. J. The alkaloids of Coptis trifolia.....	261
Schunck, E. Constitution of chlorophyll.....	219
Senier, Harold. Purgative principle of croton oil.....	22
Vesicating principle of croton oil.....	23
Sensevieria fibres, microscopic characters of.....	223
Service tree, use of, by the Cree Indians.....	619
Shoemaker, J. V. Naphthol, its medicinal uses and value.....	27
Shoemaker, Robert. The vending of nostrums.....	651



<i>Short, F. W. and W. R. Dunstan.</i> New glucoside from nux vomica.....	431
Preparation of a standard extract of nux vomica...	199
Preparation of a standard tincture of nux vomica..	203
<i>Sicana odorifera</i> , use of, in Brazil.....	622
<i>Siebold, L.</i> Pharmacy of the pomegranate.....	29
Silver nitrate, reducing action of paraffins upon.....	436
<i>Simaruba salubris</i> , use of root.....	628
<i>Sizygium jambolanum</i> , use of, in diabetes.....	476
<i>Smetham, A.</i> Soap manufacture and the soaps of commerce.....	141
<i>Smith, George.</i> Reducing action of paraffins on potassium permanganate and silver nitrate.....	436
Soap, manufacture of.....	141
methods of examination of.....	145
Soda, crude, impurities in.....	11
manufacture of, loss of sodium.....	11
Sodis-bismuth citropyroborate, formula for.....	318
Sodium borobenzoate, preparation of.....	615
choleate, preparation of.....	8
hippurate, dispensing of.....	108
nitrite, medicinal dose of.....	120
salicylate, absorption by the skin.....	184
sulphocarbolate, use of, in dyspepsia.....	42
Soja bean, use of, in Japan.....	529
<i>Solanum insidiosum</i> , use of, in Brazil.....	622
melongena in Japan.....	530
<i>Sorghum saccharatum</i> in Japan.....	530
<i>Sphaeranthus indicus</i> , volatile oil of.....	377
<i>Spigelia</i> , constituents of.....	570
<i>Spiritus ætheris nitrosi</i> , composition and deterioration of.....	378
tests for strength.....	385
Sponge, amount of iodine in.....	554, 583
<i>Squibb, E. R.</i> Aconite root.....	277
<i>Squire, Balm.</i> Ointment of salicylic acid.....	594
Standardizing pharmaceutical preparations.....	552
<i>Stanford, E. C. C.</i> Iodine in marine products.....	582
Starch grains, chemical nature of.....	371
Stathmætic estimation.....	447
<i>Sterculia acuminata</i> and other species, kola from.....	166
<i>Stigmata maydis</i> , constituents of.....	571
Still, pharmaceutical, description of.....	561
<i>Stramonium</i> alkaloids, nomenclature of.....	440
<i>Struve, H.</i> On kephir.....	195
<i>Stryphnodendron polyphyllum</i> , use of, in Brazil.....	623, 625
<i>Stütz, E.</i> Saponin from quillaia.....	276
Suberin, composition of.....	240
Sugar, maple, imitation of.....	310
milk, use of, for children.....	121
sorghum, manufacture of.....	256
Sunn-hemp, microscopic characters of.....	222
Sydenham's laudanum, precipitates in.....	473
<i>Symphonia fasciculata</i> , products and uses of.....	475
<i>Syrupus calcii lactophosphatis</i> , formula for .....	616
dentition, formula for.....	614
hypophosphitum with iron.....	357
myrrhæ, formula for.....	571
picis, preparation of.....	8
stigmata maydis.....	571
tolutanus, preparation of .....	356
various processes for.....	344

**Ta-fung-tze**, see *Hydnocarpus anthelmintica*.....

Tallow, vegetable, from Singapore.....	19
Tannin, function of, in plants.....	477
Tannins of oak bark, chemistry of.....	135
<i>Tappeiner, H.</i> Fermentation of cellulose.....	164
Tar, beech, chemistry of cœrulignol in.....	118
Tartar emetic, see Antimony and potassium tartrate	
Tecamez bark, source of.....	554
Teeth, preservation of.....	341
Tellurium, the cause of so-called bismuth breath.....	177
Teucrium Scordium, use of.....	616
Texas Pharmaceutical Association.....	397
Thaleichthys pacificus yields eulachon oil.....	628
Thapsia gargarica, constituents of resin.....	325
Theobromine in kola seeds.....	169
Theobromine, preparation, salts and derivatives.....	44
Thermometric measurements, precautions in.....	47
Thevetia nerifolia, use of, in Brazil.....	624
<i>Thompson, F. A.</i> Cascara amarga, Honduras bark.....	330
<i>Thompson, C.</i> Detection of chlorine, bromine and iodine.....	321
<i>Thompson, W. B.</i> Syrup of dentition.....	614
<i>Tilden, W. A.</i> Melting points and their relation to the solubility of hydrated salts.....	512
Tin, action of certain vegetable acids on.....	115
Tinctura calumbæ, composition of deposit in.....	101
cardamomi comp., composition of deposit in.....	102
cinchonæ comp., composition of deposit in.....	103
flavæ, composition of deposit in.....	103
ferri acetatis, composition of deposit in.....	105
gentianæ comp., composition of deposit in.....	105
hyoscyami from annual and biennial leaves.....	284
ipœcacuanhæ concentrata, deposit in.....	106
lobeliæ ætherea, deposit in.....	106
nucis vomicæ, alcoholic strength of menstruum.....	32
percentage of alkaloids in.....	33
sodium chloride in preparing.....	34
standard, process for.....	203
quinizæ, deposit in.....	106, 554
rhei, composition of deposit in.....	107
et magnesiæ, formula for.....	471
sanguinariæ, examination of precipitate and its prevention (alkali citrate).....	505
Titanium carbonate, so-called, composition of.....	648
Tobacco, estimation of nicotine in.....	497
sugar in.....	147
Trichlorphenol, antiseptic properties of.....	51
<i>Trimble, Henry.</i> Menthol.....	405
Trinitrophenol, see Acid picric.	
<i>Tschirck, A.</i> Preparation of pure chlorophyll.....	216
Tu tu, see Coriaria ruseifolia.	
Unguentum acidi salicylici, preparation of.....	494
hydrargyri, commercial, quality of.....	554
substitute for.....	492
picis, preparation of.....	8
Urea, artificial, substitute for quinine.....	121
Urena sinuata, microscopic characters of fibres.....	223
Urine, expansion of, by increase of temperature.....	88
peptones in.....	292
tests for albumen in.....	636

Valeation, or transformation of valence.....	410
<i>Valentine, P. E.</i> Infusion of digitalis.....	504
Vanilla palmarum, collection of, in Brazil.....	625
Vapor condenser, description of.....	565
Varnish, rapidly drying.....	294
Verbascum Thapsus, use of, in phthisis.....	121
Verbena hastata, sudorific properties of.....	616
Vermilion, use of, by the Cree Indians.....	620
Vieirin, origin of.....	627
Vinegar, test for mineral acids in.....	574
Vinum opii, prevention of precipitates in .....	473
picis, preparation of.....	8
Virginia State Pharmaceutical Association.....	397
<b>W</b>	
Waras, collection of.....	425
origin and description of.....	419, 423
<i>Watts, Francis.</i> Note on oil of limes.....	632
Waters, mineral, curative action of.....	120
Wax, bees', examination of (saponification).....	479
<i>Weber, R. J.</i> Luffa ægyptiaca.....	6
<i>Weddell, A.</i> Logwood as a test for metals.....	214
Welwitschia mirabilis, crystal sheath of bast fibres.....	130
Withania coagulans, rennet ferment in seeds of .....	161
White's cough syrup.....	492
<i>Wiegand, T. S.</i> Practical notes.....	8
Remedy for rhus poisoning.....	355
Sodium borobenzoate.....	615
<i>Wilder, H. M.</i> Analysis by capillarity .....	508
Gleanings from Scandinavian journals .....	573
Wine, distillate contains ammonia and formic acid.....	122
examination of.....	481
test for mineral acids in.....	574
<i>Wolff, L.</i> Pharmaceutical stills and vapor condenser.....	561
<i>Wood, C. H. and E. L. Barret.</i> Notes on cinchona alkaloids.....	43
<b>X</b>	
Xanthium Strumarium, analysis of fruit.....	134
Xanthoxylum caribæum, constituents of bark .....	579
leaves collected for jaborandi.....	622
Tinguassiba, alkaloid and sudorific properties of.....	627
<b>Y</b>	
Yucca fibres, microscopic appearance of.....	223

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